User's Manual

701992/701994
Xviewer

YOKOGAWA
Yokogawa Meters & Instruments Co

IM 701992-01E
8th Edition

Foreword

Thank you for purchasing the Xviewer (Model 701992/701994*) waveform viewer software.
This User's Manual contains information on the functions and operation of the Xviewer, as well as precautions that must be observed. This manual mainly focuses on operation under Windows XP. To ensure the correct operation of the Xviewer, read this manual thoroughly before attempting to use the product. After reading the manual, keep it in a convenient location for quick reference whenever a question arises during operation.
Furthermore, for handling precautions, functions, and operating procedures of the DL series, SL1400, SL1000, or other instruments, or for the handling and operating procedures of Windows, please see the manuals for those respective products.
The following manuals, including this one, are provided as manuals for the Xviewer. Read them along with this manual.

Manual	Title Manual No.	Description
701992/701994 Xviewer User's Manual	IM 701992-01E	This manual. Explains the Xviewer's standard features and how to use these features.
Xviewer DL850 Advanced Utility User's Manual	IM 701992-62E	Explains the DL850 advanced utility features and how to use these features.

* The model 701994 was discontinued at the end of April, 2006.

Notes

- If the most recent software version is not running on your Xviewer, not all of the features described in this manual can be used. You can check the software version of your Xviewer on the version information screen. For instructions on how to open the version information screen, see section 9.2 in this manual. To upgrade to the latest software version, go to the following Web page, and then browse to the download page.
  http://tmi.yokogawa.com/service-support/downloads
- The contents of this manual are subject to change without prior notice due to performance/functional improvements to the software or related products. The images appearing in this manual are for illustrative purposes only and may differ slightly from the screens that actually appear on your machine.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, contact your nearest Yokogawa dealer.
- Copying or reproducing all or any part of the contents of this manual without the permission of Yokogawa Electric Corporation is strictly prohibited.

Trademarks

- Microsoft, Windows, Windows XP, and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- Adobe, Acrobat, and PostScript are either registered trademarks or trademarks of Adobe Systems Incorporated.
- In this manual, the ® and TM symbols do not accompany their respective registered trademark names or trademark names.
- Other company names and product names are registered trademarks or trademarks of their respective holders.

Revisions

- January 2005 1st edition issued
- July 2005 2nd edition issued
- October 2005 3rd edition issued
- August 2006 4th edition issued
- March 2007 5th edition issued
- December 2007 6th edition issued
- September 2008 7th edition issued
- September 2010 8th edition issued

8th Edition : September 2010 (YK)
All Rights Reserved, Copyright © 2004 Yokogawa Electric Corporation
All Rights Reserved, Copyright © 2010 Yokogawa Meters & Instruments Corporation

Terms and Conditions of the Software License

Yokogawa Electric Corporation and Yokogawa Meters & Instruments Corporation, Japanese corporations (hereinafter called "Yokogawa"), grant permission to use this Yokogawa Software Program (hereinafter called the "Licensed Software") to the Licensee on the conditions that the Licensee agrees to the terms and conditions stipulated in Article 1 hereof.
You, as the Licensee (hereinafter called "Licensee"), shall agree to the following terms and conditions for the software license (hereinafter called the "Agreement") based on the use intended for the Licensed Software.
Please note that Yokogawa grants the Licensee permission to use the Licensed Software under the terms and conditions herein and in no event shall Yokogawa intend to sell or transfer the Licensed Software to the Licensee.
Licensed Software Name : Xviewer (Model 701992 or 701994) or XviewerEYE (Model 701992)
Number of License : The number of licenses printed on the license seal

Article 1 (Scope Covered by these Terms and Conditions)

1.1 The terms and conditions stipulated herein shall be applied to any Licensee who purchases the Licensed Software on the condition that the Licensee consents to agree to the terms and conditions stipulated herein.
1.2 The "Licensed Software" herein shall mean and include all applicable programs and documentation, without limitation, all proprietary technology, algorithms, and know-how such as a factor, invariant or process contained therein.

Article 2 (Grant of License)

2.1 Yokogawa grants the Licensee, for the purpose of single use, non-exclusive and non-transferable license of the Licensed Software with the license fee separately agreed upon by both parties.
2.2 The Licensee is, unless otherwise agreed in writing by Yokogawa, not entitled to copy, change, sell, distribute, transfer, or sublicense the Licensed Software.
2.3 The Licensed Software shall not be copied in whole or in part except for keeping one (1) copy for back-up purposes. The Licensee shall secure or supervise the copy of the Licensed Software by the Licensee itself with great, strict, and due care.
2.4 In no event shall the Licensee dump, reverse assemble, reverse compile, or reverse engineer the Licensed Software so that the Licensee may translate the Licensed Software into other programs or change it into a man-readable form from the source code of the Licensed Software. Unless otherwise separately agreed by Yokogawa, Yokogawa shall not provide the Licensee the source code for the Licensed Software.
2.5 The Licensed Software and its related documentation shall be the proprietary property or trade secret of Yokogawa or a third party which grants Yokogawa the rights. In no event shall the Licensee be transferred, leased, sublicensed, or assigned any rights relating to the Licensed Software.
2.6 Yokogawa may use or add copy protection in or onto the Licensed Software. In no event shall the Licensee remove or attempt to remove such copy protection.
2.7 The Licensed Software may include a software program licensed for re-use by a third party (hereinafter called "Third Party Software", which may include any software program from affiliates of Yokogawa made or coded by themselves.) In the case that Yokogawa is granted permission to sublicense to third parties by any licensors (sub-licensor) of the Third Party Software pursuant to different terms and conditions than those stipulated in this Agreement, the Licensee shall observe such terms and conditions of which Yokogawa notifies the Licensee in writing separately.
2.8 In no event shall the Licensee modify, remove or delete a copyright notice of Yokogawa and its licenser contained in the Licensed Software, including any copy thereof.

Article 3 (Restriction of Specific Use)

3.1 The Licensed Software shall not be intended specifically to be designed, developed, constructed, manufactured, distributed or maintained for the purpose of the following events:
a) Operation of any aviation, vessel, or support of those operations from the ground;,
b) Operation of nuclear products and/or facilities;,
c) Operation of nuclear weapons and/or chemical weapons and/or biological weapons; or
d) Operation of medical instrumentation directly utilized for humankind or the human body.
3.2 Even if the Licensee uses the Licensed Software for the purposes in the preceding Paragraph 3.1, Yokogawa has no liability to or responsibility for any demand or damage arising out of the use or operations of the Licensed Software, and the Licensee agrees, on its own responsibility, to solve and settle the claims and damages and to defend, indemnify or hold Yokogawa totally harmless, from or against any liabilities, losses, damages and expenses (including fees for recalling the Products and reasonable attorney's fees and court costs), or claims arising out of and related to the above-said claims and damages.

Article 4 (Warranty)

4.1 The Licensee shall agree that the Licensed Software shall be provided to the Licensee on an "as is" basis when delivered. If defect(s), such as damage to the medium of the Licensed Software, attributable to Yokogawa is found, Yokogawa agrees to replace, free of charge, any Licensed Software on condition that the defective Licensed Software shall be returned to Yokogawa' s specified authorized service facility within seven (7) days after opening the Package at the Licensee's expense. As the Licensed Software is provided to the Licensee on an "as is" basis when delivered, in no event shall Yokogawa warrant that any information on or in the Licensed Software, including without limitation, data on computer programs and program listings, be completely accurate, correct, reliable, or the most updated.
4.2 Notwithstanding the preceding Paragraph 4.1, when third party software is included in the Licensed Software, the warranty period and terms and conditions that apply shall be those established by the provider of the third party software.
4.3 When Yokogawa decides in its own judgement that it is necessary, Yokogawa may from time to time provide the Licensee with Revision upgrades and Version upgrades separately specified by Yokogawa (hereinafter called "Updates").
4.4 Notwithstanding the preceding Paragraph 4.3, in no event shall Yokogawa provide Updates where the Licensee or any third party conducted renovation or improvement of the Licensed Software.
4.5 THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF QUALITY AND PERFORMANCE, WRITTEN, ORAL, OR IMPLIED, AND ALL OTHER WARRANTIES INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED BY YOKOGAWA AND ALL THIRD PARTIES LICENSING THIRD PARTY SOFTWARE TO YOKOGAWA.
4.6 Correction of nonconformity in the manner and for the period of time provided above shall be the Licensee's sole and exclusive remedy for any failure of Yokogawa to comply with its obligations and shall constitute fulfillment of all liabilities of Yokogawa and any third party licensing the Third Party Software to Yokogawa (including any liability for direct, indirect, special, incidental or consequential damages) whether in warranty, contract, tort (including negligence but excluding willful conduct or gross negligence by Yokogawa) or otherwise with respect to or arising out of the use of the Licensed Software.

Article 5 (Infringement)

5.1 If and when any third party should demand injunction, initiate a law suit, or demand compensation for damages against the Licensee under patent right (including utility model right, design patent, and trade mark), copy right, and any other rights relating to any of the Licensed Software, the Licensee shall notify Yokogawa in writing to that effect without delay.

5.2 In the case of the preceding Paragraph 5.1, the Licensee shall assign to Yokogawa all of the rights to defend the Licensee and to negotiate with the claiming party. Furthermore, the Licensee shall provide Yokogawa with necessary information or any other assistance for Yokogawa's defense and negotiation. If and when such a claim should be attributable to Yokogawa, subject to the written notice to Yokogawa stated in the preceding Paragraph 5.1, Yokogawa shall defend the Licensee and negotiate with the claiming party at Yokogawa's cost and expense and be responsible for the final settlement or judgment granted to the claiming party in the preceding Paragraph 5.1.

5.3 When any assertion or allegation of the infringement of the third party's rights defined in Paragraph 5.1 is made, or when at Yokogawa's judgment there is possibility of such assertion or allegation, Yokogawa will, at its own discretion, take any of the following countermeasures at Yokogawa's cost and expense.

a) To acquire the necessary right from a third party which has lawful ownership of the right so that the Licensee will be able to continue to use the Licensed Software;
b) To replace the Licensed Software with an alternative one which avoids the infringement; or
c) To remodel the Licensed Software so that the Licensed Software can avoid the infringement of such third party's right.

5.4 If and when Yokogawa fails to take either of the countermeasures as set forth in the preceding subparagraphs of Paragraph 5.3, Yokogawa shall indemnify the Licensee only by paying back the price amount of the Licensed Software which Yokogawa has received from the Licensee. THE FOREGOING PARAGRAPHS STATE THE ENTIRE LIABILITY OF YOKOGAWA AND ANY THIRD PARTY LICENSING THIRD PARTY SOFTWARE TO YOKOGAWA WITH RESPECT TO INFRINGEMENT OF THE INTELLECTUAL PROPERTY RIGHTS INCLUDING BUT NOT LIMITED TO, PATENT AND COPYRIGHT.

Article 6 (Liabilities)

6.1 If and when the Licensee should incur any damage relating to or arising out of the Licensed Software or service that Yokogawa has provided to the Licensee under the conditions herein due to a reason attributable to Yokogawa, Yokogawa shall take actions in accordance with this Agreement. However, in no event shall Yokogawa be liable or responsible for any special, incidental, consequential and/or indirect damage, whether in contract, warranty, tort, negligence, strict liability, or otherwise, including, without limitation, loss of operational profit or revenue, loss of use of the Licensed Software, or any associated products or equipment, cost of capital, loss or cost of interruption of the Licensee's business, substitute equipment, facilities or services, downtime costs, delays, and loss of business information, or claims of customers of Licensee or other third parties for such or other damages. Even if Yokogawa is liable or responsible for the damages attributable to Yokogawa and to the extent of this Article 6, Yokogawa's liability for the Licensee's damage shall not exceed the price amount of the Licensed Software or service fee which Yokogawa has received. Please note that Yokogawa shall be released or discharged from part or all of the liability under this Agreement if the Licensee modifies, remodels, combines with other software or products, or causes any deviation from the basic specifications or functional specifications, without Yokogawa's prior written consent.

6.2 All causes of action against Yokogawa arising out of or relating to this Agreement or the performance or breach hereof shall expire unless Yokogawa is notified of the claim within one (1) year of its occurrence.

6.3 In no event, regardless of cause, shall Yokogawa assume responsibility for or be liable for penalties or penalty clauses in any contracts between the Licensee and its customers.

Article 7 (Limit of Export)

Unless otherwise agreed by Yokogawa, the Licensee shall not directly or indirectly export or transfer the Licensed Software to any countries other than those where Yokogawa permits export in advance.

Article 8 (Term)

This Agreement shall become effective on the date when the Licensee receives the Licensed Software and continues in effect unless or until terminated as provided herein, or the Licensee ceases using the Licensed Software by itself or with Yokogawa's thirty (30) days prior written notice to the Licensee.

Article 9 (Injunction for Use)

During the term of this Agreement, Yokogawa may, at its own discretion, demand injunction against the Licensee in case that Yokogawa deems that the Licensed Software is used improperly or under severer environments other than those where Yokogawa has first approved, or any other condition which Yokogawa may not permit.

Article 10 (Termination)

Yokogawa, at its sole discretion, may terminate this Agreement without any notice or reminder to the Licensee if the Licensee violates or fails to perform this Agreement. However, Articles 5, 6, and 11 shall survive even after the termination.

Article 11 (Jurisdiction)

Any dispute, controversies, or differences between the parties hereto as to interpretation or execution of this Agreement shall be resolved amicably through negotiation between the parties upon the basis of mutual trust. Should the parties fail to agree within ninety (90) days after notice from one of the parties to the other, both parties hereby irrevocably submit to the exclusive jurisdiction of the Tokyo District Court (main office) in Japan for settlement of the dispute.

Article 12 (Governing Law)

This Agreement shall be governed by and construed in accordance with the laws of Japan. The Licensee expressly agrees to waive absolutely and irrevocably and to the fullest extent permissible under applicable law any rights against the laws of Japan which it may have pursuant to the Licensee's local law.

Article 13 (Severability)

In the event that any provision hereof is declared or found to be illegal by any court or tribunal of competent jurisdiction, such provision shall be null and void with respect to the jurisdiction of that court or tribunal and all the remaining provisions hereof shall remain in full force and effect.

Checking the Contents of the Package

After opening the package, check that it contains the items listed below. If any of thecontents are incorrect, missing, or damaged, contact the dealer from whom youpurchased it.

CD × 1

Model	Suffix Code	Description
701992		Xviewer
701994		Upgraded version of 700919
Grade/Number of Licenses	-SP01	Standard edition (1 license)
	-SP05	Standard edition (5 licenses)
	-SP10	Standard edition (10 licenses)
	-SP20	Standard edition (20 licenses)
	-GP01	Math edition (1 license)
	-GP05	Math edition (5 licenses)
	-GP10	Math edition (10 licenses)
	-GP20	Math edition (20 licenses)
	-ES01	XviewerEYE standard edition (1 license)
	-ES02	XviewerEYE standard edition (2 licenses)
	-ES03	XviewerEYE standard edition (3 licenses)
	-ES04	XviewerEYE standard edition (4 licenses)
	-ES05	XviewerEYE standard edition (5 licenses)
	-ES10	XviewerEYE standard edition (10 licenses)
	-EG01	XviewerEYE math edition (1 license)
	-EG02	XviewerEYE math edition (2 licenses)
	-EG03	XviewerEYE math edition (3 licenses)
	-EG04	XviewerEYE math edition (4 licenses)
	-EG05	XviewerEYE math edition (5 licenses)
	-EG10	XviewerEYE math edition (10 licenses)
	/JS01	DL850 Advanced Utility (1 license)
	/JS02	DL850 Advanced Utility (2 licenses)
	/JS03	DL850 Advanced Utility (3 licenses)
	/JS04	DL850 Advanced Utility (4 licenses)
	/JS05	DL850 Advanced Utility (5 licenses)
	/JS10	DL850 Advanced Utility (10 licenses)
	/JS20	DL850 Advanced Utility (20 licenses)

Manuals

Manual Title	Manual No.
701992/701994 Xviewer User's Manual (Located on the CD)	IM 701992-01E
Xviewer DL850 Advanced Utility User's Manual (Located on the CD)	IM 701992-62E
701992/701994 Xviewer Install Manual	IM 701992-02E

License seal × 1

Symbols and Notations Used in This Manual

Marking

The following marking is used in this manual

Note Calls attention to information that is important for proper operation of the instrument.

Notation Used in the Procedural Explanations

On pages that describe the operating procedures in each chapter, the following notations are used to distinguish the procedures from their explanations.

Procedure Carry out the procedure according to the step numbers. All procedures are written with inexperienced users in mind; experienced users may not need to carry out all the steps.

Explanation This section describes the setup items and the limitations regarding the procedures.

Notation in Boldface

Boldface type indicates the names of user-controlled panel keys, and soft key items and menu items displayed on screen.

Contents

Terms and Conditions of the Software License ii
Symbols and Notations Used in This Manual v
Product Overview viii
Important Notice x
Installing/Uninstalling Xviewer xi

Chapter 1 Basic Operations

1.1 Starting and Closing Xviewer 1-1
1.2 Basic Operations Performed From the Startup Windows 1-2

Chapter 2 Displaying Waveform Data

2.1 Loading Waveform Data 2-1
2.2 Displaying Waveforms in the Main View 2-6
2.3 Displaying Waveforms in a Zoomed View 2-7
2.4 Displaying Waveforms in the History View 2-9
2.5 Displaying a Waveform in the X-Y View 2-11
2.6 Moving or Zooming Waveforms 2-13
2.7 Splitting the Screen 2-15
2.8 Displaying Waveforms Acquired with the DL850 Dual Capture Function (version 1.60 or later) 2-16
2.9 Switching between Groups 2-17
2.10 Showing Marks 2-18

Chapter 3 Specifying Display Settings for Waveform Data

3.1 Loading Display Settings 3-1
3.2 Setting Waveforms (Channels) to be Displayed 3-2
3.3 Specifying Split Settings 3-8
3.4 Specifying Display Settings 3-9
3.5 Initializing Display Settings 3-13

Chapter 4 Analyzing Waveform Data

4.1 Displaying Measurement Results 4-1
4.2 Analyzing Waveform Data Using Cursors 4-2
4.3 Automated Measurement of Waveform 4-5
4.4 Analyzing Waveforms by Computations (Math Edition) 4-10
4.5 Inserting Annotations in the Waveform View 4-22
4.6 Transferring a Waveform View to the Clipboard 4-32

Chapter 5 Saving Data/Converting Data Formats

5.1 Saving Waveform Data 5-1
5.2 Transferring Waveform Data into Excel 5-6
5.3 Saving Waveform Data in a View 5-8
5.4 Saving Automated Measurement Values forWaveform Parameters 5-9
5.5 Saving the Display Settings 5-10
5.6 Converting Multiple Waveform Data Files to CSV Files 5-11
5.7 Converting WDF Files to WVF Files 5-13
5.8 Converting WDF/WVF Files to FLD Files (version 1.60 or later) 5-15

Chapter 6 Printing Waveforms in the Displayed View

6.1 Setting Up a Printer 6-1
6.2 Printing Displayed Waveforms 6-2

Chapter 7 Report Function

7.1 Using the Report Function (Xreport) 7-1
7.2 Editing Reports 7-4
7.3 Saving, Loading, or Deleting Report Files 7-8
7.4 Printing Reports 7-10

Chapter 8 Communicating with the Instruments

8.1 Connecting to the Instruments 8-1
8.2 Displaying a File List 8-5
8.3 Manipulating Files 8-7
8.4 Operating the Instruments from a PC(Other than the DL9000/SB5000/DLM2000/DL6000/DLM6000/DL850/DL850V) 8-10
8.5 Operating DL9000/SB5000/DLM2000/DL6000/DLM6000/DL850/DL850V from a PC 8-15
8.6 Downloading the Instruments Waveform Data (Other than the DL9000/SB5000/DLM2000/DL6000/DLM6000/DL850/DL850V) 8-21
8.7 Downloading DL9000/SB5000/DLM2000/DL6000/DLM6000/DL850/DL850V Waveform Data 8-22

Chapter 9 Troubleshooting

9.1 Troubleshooting 9-1
9.2 Viewing Version Information 9-2
9.3 Starting Online Help 9-3
9.4 Visiting the Yokogawa Electric Web Page 9-4
9.5 Adding a License Number 9-5

Chapter 10 Specifications

10.1 Applicable Models and Features 10-1
10.2 System Environment Requirements 10-2
10.3 Software Versions and the Added Functions 10-3

Index

Product Overview

Waveform Viewer Xviewer

Viewing and Analyzing Data Saved with the Instruments

You can view and analyze data saved with the measuring instruments on a personal computer (hereinafter, PC).
The formats of the files saved by the measuring instruments are as follows.

Model	File Types		
	CSV*1	WVF*2	WDF
WE7000	Yes	Yes	No
DL1700 series	Yes	Yes	No
DL1600 series	Yes	Yes	No
DL1700E series	Yes	Yes	No
DL7400 series	Yes	Yes	No
DL750 series	Yes	Yes	Yes*3
SL1400	Yes	Yes	Yes*3
DL9040/DL9140/DL9240 series	Yes	No	Yes*2
DL9500/DL9700 series	Yes	No	Yes*2
SB5000 series	Yes	No	Yes*2
SL1000	No	No	Yes*2,*3
DLM2000 series	Yes	No	Yes*2
DL6000/DLM6000 series	Yes	No	Yes*2
DLM850	Yes	No	Yes*2

*1 Files created and saved in ASCII format
*2 Files created and saved in binary format
*3 Files created with real-time recording

This document refers to the DL9040/DL9140/DL9240 series, and the DL9500/DL9700 series collectively as the “DL9000 series”.

Viewing and Transferring Files Saved with the Instruments

Xviewer supports the viewing of the instrument files as well as the transfer of files between the instrument and your PC by using the GP-IB/USB/Ethernet interface. The communication interfaces and functions that can be used are shown on the next page.

Note

Xviewer file transfer from your PC to the instrument is possible only via the USB interface.

Remote Control of the Instruments

With the GP-IB/USB/Ethernet interface, Xviewer supports the display of images (control windows) from the instrument on your PC, as well as the remote-control of the instrument as if you were operating the unit from its own control panel. In addition, to enable the setup of a control window environment, Xviewer features Environment Setting Keys, which are not found on the DL unit.
The communication interfaces and functions that can be used are shown on the next page.

Downloading the Instruments Acquisition Data

The instrument acquisition data can be downloaded to a PC using the GP-IB, USB, or Ethernet interface.
The communication interfaces and functions that can be used are shown on the next page.

Available communication interface

Model	Interface		
	GP-IB	USB*1	Ethernet
WE7000	No	No	No
DL1700 series	No	No	No
DL1600 series	Yes	Yes	Yes
DL1700E series	Yes	Yes	Yes
DL7400 series	Yes	Yes	Yes
DL750 series	Yes	Yes	Yes
SL1400	Yes	Yes	Yes
DL9040/DL9140/DL9240 series	Yes	Yes*2	Yes
DL9500/DL9700 series	Yes	Yes*2	Yes
SB5000 series	Yes	Yes*2	Yes
SL1000	No	Yes*2	Yes*3
DLM2000 series	Yes	Yes*2	Yes*3
DL6000/DLM6000 series	Yes	Yes*2	Yes*3
DLM850	Yes	Yes*2	Yes*3

*1 If the PC's OS is Windows Vista, communications via the USB interface are not supported with all DL series instruments, the SL1400, and the SB5000 series.

*2 Control by USB-TMC

*3 Control by VXI11

Available function

Model	Communication Function		
	Viewing and Transferring Files	Remote Control	Downloading Acquisition Data
WE7000	No	No	No
DL1700 series	No	No	No
DL1600 series	Yes Version 1.12 or later	Yes Version 1.12 or later	Yes Version 1.30 or later
DL1700E series	Yes	Yes	Yes Version 2.11 or later
DL7400 series	Yes Version 1.23 or later	Yes Version 1.23 or later	Yes Version 2.11 or later
DL750 series	Yes Version 2.50 or later	Yes Version 2.50 or later	Yes Version 6.01 or later
SL1400	Yes	Yes	Yes
DL9040/DL9140/DL9240 series	Yes Version 1.80 or later	Yes Version 1.64 or later	Yes Version 1.80 or later
DL9500/DL9700 series	Yes	Yes	Yes
SB5000 series	Yes	Yes	Yes
SL1000	Yes	No	No
DLM2000 series	Yes	Yes	Yes
DL6000/DLM6000 series	Yes	Yes	Yes
DLM850	Yes	Yes	Yes

System Environment Requirements

See section 10.2

Important Notice

Keep the Original CD-ROM Safe

Keep the original Xviewer CD-ROM in a safe place. Normally, the software should be installed onto and run from a hard drive.

Precautions on the Use of Xviewer

- When you are using Xviewer, do not attempt to manipulate the instruments connected to it; the units may malfunction
- Xviewer may be unable to operate if the PC goes into standby mode. Disable standby mode on your PC before starting up Xviewer.
- If you start this software program when using the Ethernet interface, the line load will differ depending on the measuring instrument used. For details, see section 8.1. Check with your network administrator as to whether these traffic loads can be handled by your network.
- Do not attempt to use Xviewer to alter the network or communication settings of the connected the instruments. Doing so may lead to a communication failure between the instruments.
- Do not attempt any self-tests with Xviewer.
- One Xviewer instance can control only one instrument. In addition, multiple PCs cannot be connected to a single instrument.
- Xviewer does not support the thumbnail previews offered by the DL1600/DL1700E series. Also, Xviewer does not support the thumbnails or previews offered by the DL7400 series.
- In the event of a connection error with the instrument, power off the instrument, and then turn it on again.

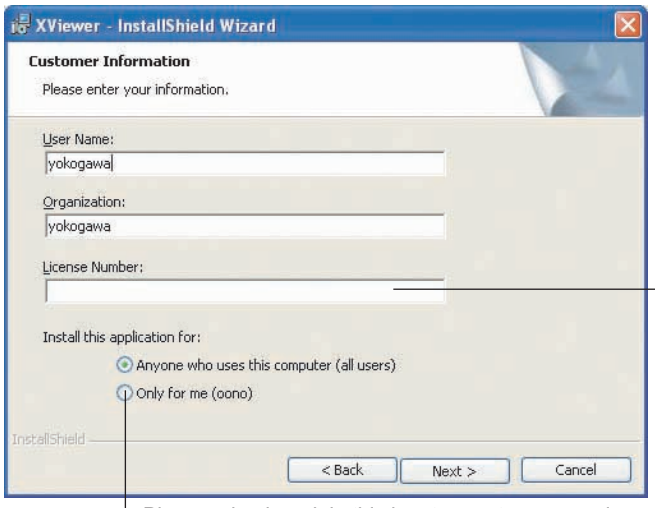
Installing/Uninstalling Xviewer

Procedure

Installing Xviewer

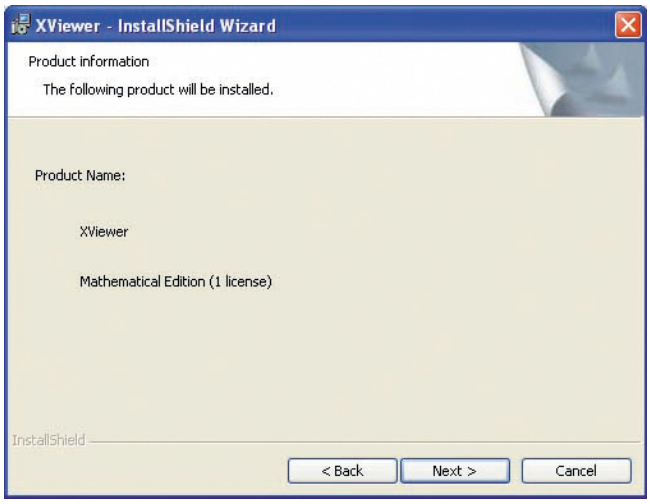
The steps below assume the use of Windows XP.

1. Turn on your PC, log on with the Administrator account, then wait for Windows to start up.
2. Place the Xviewer CD-ROM in the PC's CD-ROM drive. The Xviewer Installer starts automatically and begins to prepare the installation.
3. Follow the displayed instructions and then click **Next**.
4. The **Agreements** screen is displayed and prompts you to indicate whether you agree with the conditions of use for the software. Once you have read and agreed to the conditions of use, place a check mark against **I Agree with the Conditions of Use** and then click **Next**.
5. A screen for entering user information is displayed. Enter the **User Name**, **Organization**, and **License Number**, specify the users who will be allowed to use Xviewer, and then click **Next**. The license number can be found on a label applied to the outside of the CD-ROM case.

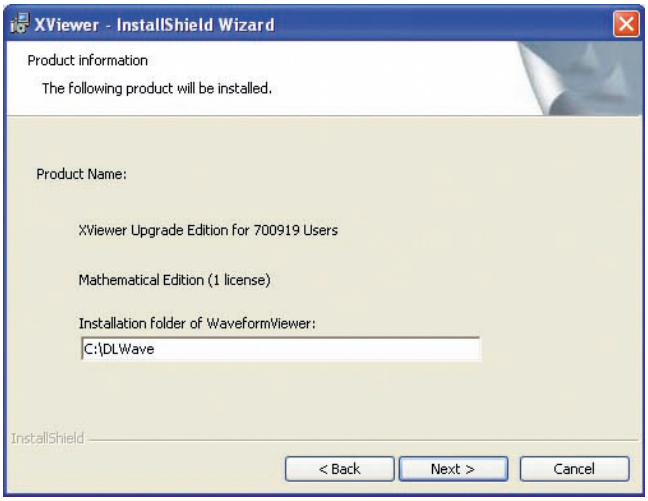

XViewer - InstallShield Wizard
Customer Information
Please enter your information.
User Name:
yokogawa
Organization:
yokogawa
License Number:
Install this application for:
Anyone who uses this computer (all users)
Only for me (oono)
InstallShield
< Back
Next >
Cancel
Enter the license number printed on the installation disk package
Place a checkmark in this box to grant access only to the logged-in user who has installed Xviewer

6. A product information screen is displayed. Click **Next**.

   701992:



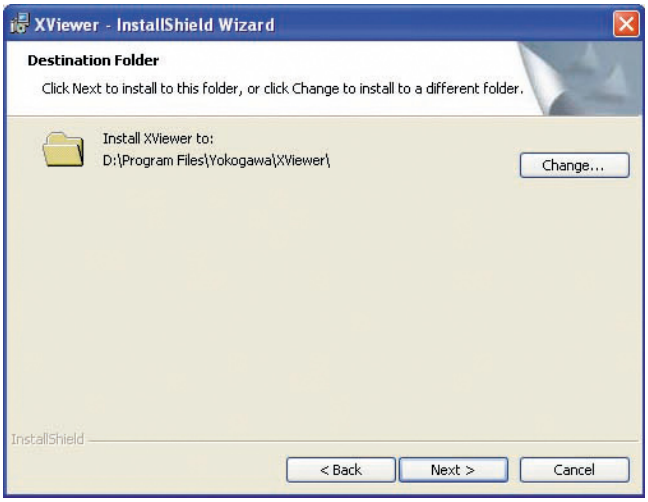
701994:



Note

- Xviewer 701994 is an upgrade from Waveform Viewer 700919. Install 700919 on the PC before installing 701994 on the PC.
- The default folder when installing 701994 is the same as that of 700919. If 700919 has been installed in a different folder, specify that 700919 installation folder.
- If the folder containing 700919 cannot be found, an error message will appear. Input the correct folder into which 700919 was installed.

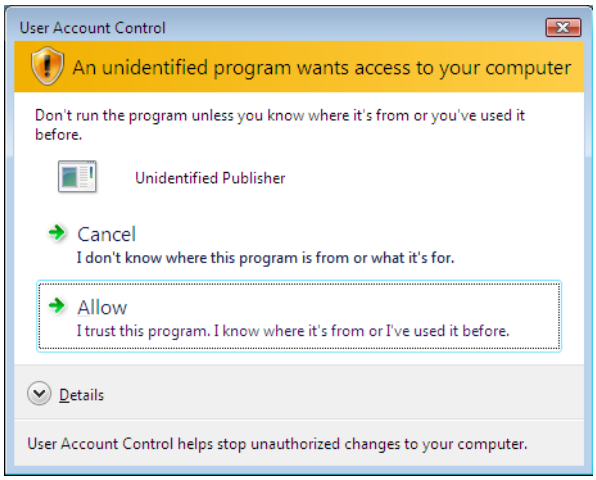
7. The installation folder screen is displayed. The default setting is C:\Program Files\Yokogawa\Xviewer. To specify a different installation folder, click **Browse**. After specifying the installation folder, click **Next**.



8. The installation start screen is displayed. Click **Install** to start installing Xviewer. The Installer starts the installation of Xviewer.

To return to the previous screen and change installation settings, click **Back**. To cancel the installation, click **Cancel**.

If the PC's OS is Windows Vista or Windows 7, the User Account Control screen will appear part way through the installation. Click **Allow** to continue with the installation.


User Account Control
An unidentified program wants access to your computer
Don't run the program unless you know where it's from or you've used it before.
Unidentified Publisher
Cancel
I don't know where this program is from or what it's for.
Allow
I trust this program. I know where it's from or I've used it before.
Details
User Account Control helps stop unauthorized changes to your computer.

If the software installation finishes normally, the following screen appears.

Xviewer - InstallShield Wizard
InstallShield Wizard Completed
Setup has finished installing Xviewer.
When connecting to a DL series instrument via USB, install the dedicated USB driver.
The USB driver is included on the product CD-ROM. You can also download the software from our Web site.
For the USB driver and installation instructions, see the user's manual or the Web site below.
http://www.yokogawa.com/tm/software
(The "TMCTL" dedicated communication Library for DL/WT series supports for Ethernet, USB, GPIB, and SERIAL Interfaces)
< Back
Finish
Cancel

9. Click **Finish** to close the Installer. A Yokogawa > Xviewer selection will be available when you click Start > Programs and a shortcut icon to Xviewer will appear on the desktop.

Note

If an older version of Xvewer is already installed on the PC, you must uninstall that version before proceeding with the installation of the new one.

Uninstalling Xviewer

The steps below assume the use of Windows XP.

1. Select **Control Panel** from the Start menu.
2. Double-click **Add/Remove Programs** on Control Panel.
3. Select **Xviewer** in the list displayed for Add/Remove Programs, and then click **Remove**.
4. A screen appears asking you to confirm whether you want to delete Xviewer.

   Click **Yes** to proceed. Xviewer is removed from your PC.
   Click **No** to cancel.

   If the PC's OS is Windows Vista or Windows 7, the User Account Control screen will appear part way through the uninstallation. Click **Allow** to continue with the uninstallation.

Explanation

USB Driver

To establish a USB connection with the DL series unit, Xviewer requires that the USB driver be installed for that DL series unit. The USB driver is included in the Xviewer installation disk. The most-recent USB driver can be downloaded from the following Web page.
http://www.yokogawa.com/tm/tm-softdownload.htm

- **Contents of the Installation Disc**

  The following three USB drivers for DL series instruments are included. Please install the USB driver for the DL series instrument you will be using.

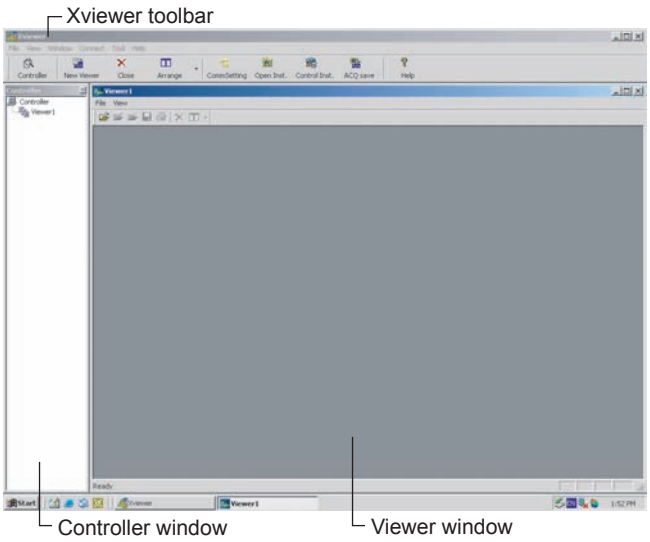
Folder	Description	Contents
YKMUSB	USB driver for DLs not in the DL9000/SB5000 series YKMUSB_X32(for 32-bit OS) YKMUSB_X64(for 64-bit OS)	USB driver and installation manual
yKMUSBTMC	USB driver for the DL9000/ SB5000 series	USB driver and installation manual

1.1 Starting and Closing Xviewer

Procedure

Starting Xviewer

From the Windows **Start** menu, select **Programs > Yokogawa > Xviewer.** Xviewer starts up and displays the Xviewer toolbar, controller window, and viewer window, as shown below:



Closing Xviewer

Select **File > Close Xviewer** from the Xviewer toolbar.

Note

If the extension of the waveform data files is as follows, you can double-click the file to start Xviewer and display the waveform on the viewer.

- wvf
- wdf

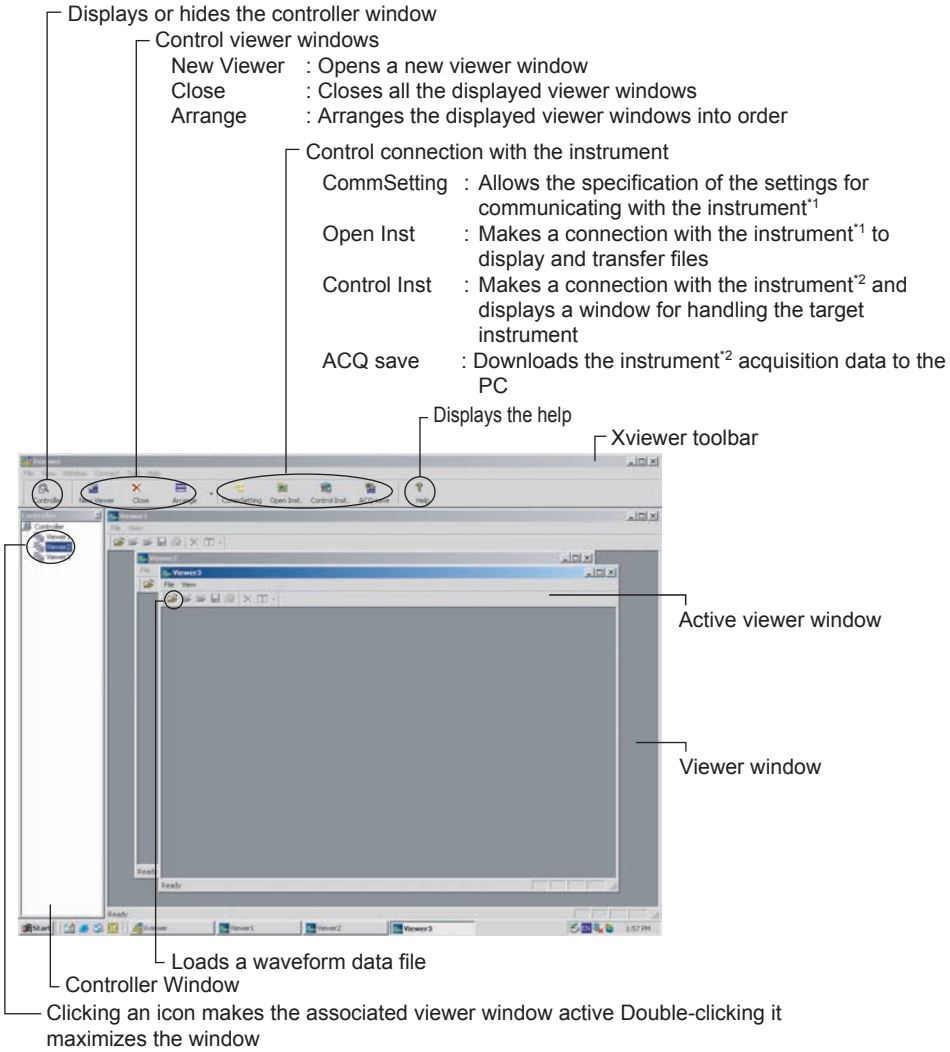
1.2 Basic Operations Performed From the Startup Windows

Procedure

Xviewer toolbar:
Used to manipulate the controller window and viewer windows and to control the connection with the instrument.

Controller window:
Used to make one of the displayed viewer windows active.

Viewer window:
Used to load, display, and analyze waveform data. Multiple viewer windows can be displayed and used to load, display, and analyze waveform data in the respective viewer windows.


Displays or hides the controller window
Control viewer windows
New Viewer : Opens a new viewer window
Close : Closes all the displayed viewer windows
Arrange : Arranges the displayed viewer windows into order
Control connection with the instrument
CommSetting : Allows the specification of the settings for communicating with the instrument*1
Open Inst : Makes a connection with the instrument*1 to display and transfer files
Control Inst : Makes a connection with the instrument*2 and displays a window for handling the target instrument
ACQ save : Downloads the instrument*2 acquisition data to the PC
Displays the help
Xviewer toolbar
Active viewer window
Viewer window
Loads a waveform data file
Controller Window
Clicking an icon makes the associated viewer window active Double-clicking it maximizes the window

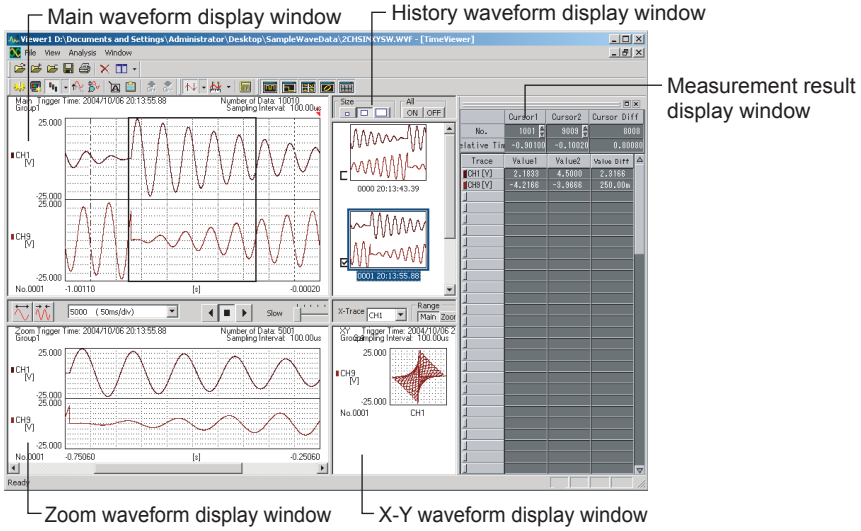
*1 DL750 series, DL9000 series, SB5000 series, DL7400 series, DL1700E series, DL1600 series, SL1400, and SL1000
*2 DL750 series, DL9000 series, SB5000 series, DL7400 series, DL1700E series, DL1600 series, and SL1400

Explanation

Types of Viewer Window

There are five types of viewer window:

- **Main waveform display window:** Displays all of the loaded waveform data.
- **Zoom waveform display window:** Zooms the loaded waveform data.
- **History waveform display window:** Displays all the waveform data records obtained by means of sequential store, single (N) trigger mode, and/or history feature.
- **X-Y waveform display window :** Plots a channel (trace) in the main/zoom window as an X-Y view.
- **Measurement result display window:** Measured values such as cursor measurements, automatic measurements, and measurements through computation are displayed as numerical values.


Main waveform display window
History waveform display window
Measurement result display window
Zoom waveform display window
X-Y waveform display window

Resizable Windows

By dragging the borders of the Xviewer tool bar, control window, and viewer window, you can change the size of the window arbitrarily.

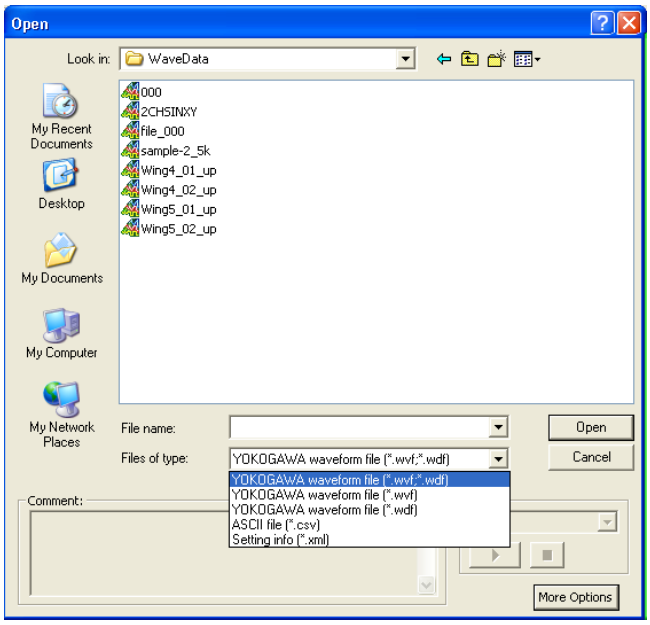
Click **Arrange** on the tool bar to adjust the size of the Viewer window according to that of the Xviewer tool bar and control window.

Closing Xviewer

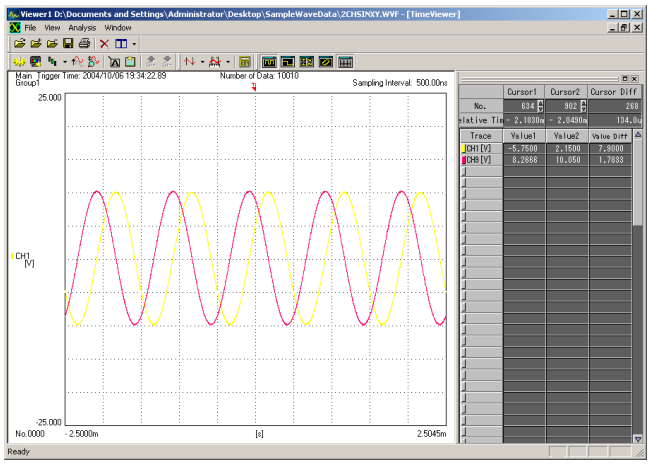
2.1 Loading Waveform Data

Procedure

1. Click or select **File > Open**. The Open File dialog box appears.

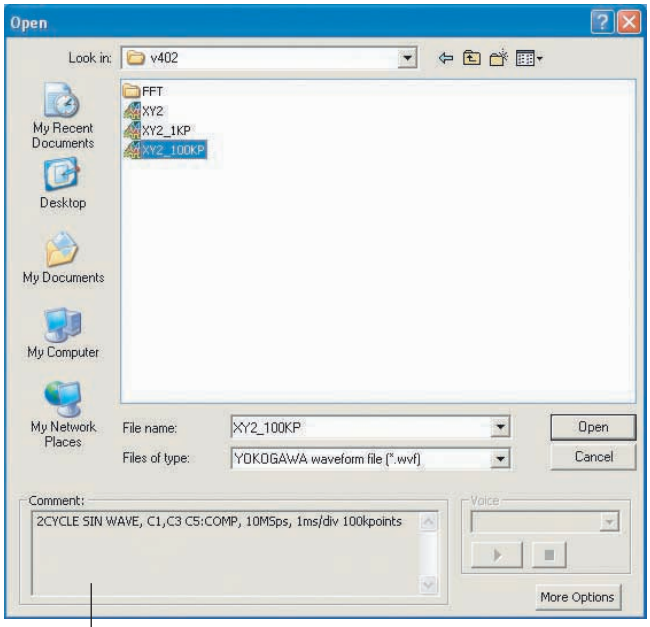


2. To display a waveform, either select the file to open from the File name field, or enter the name of the file and then click **Open**.



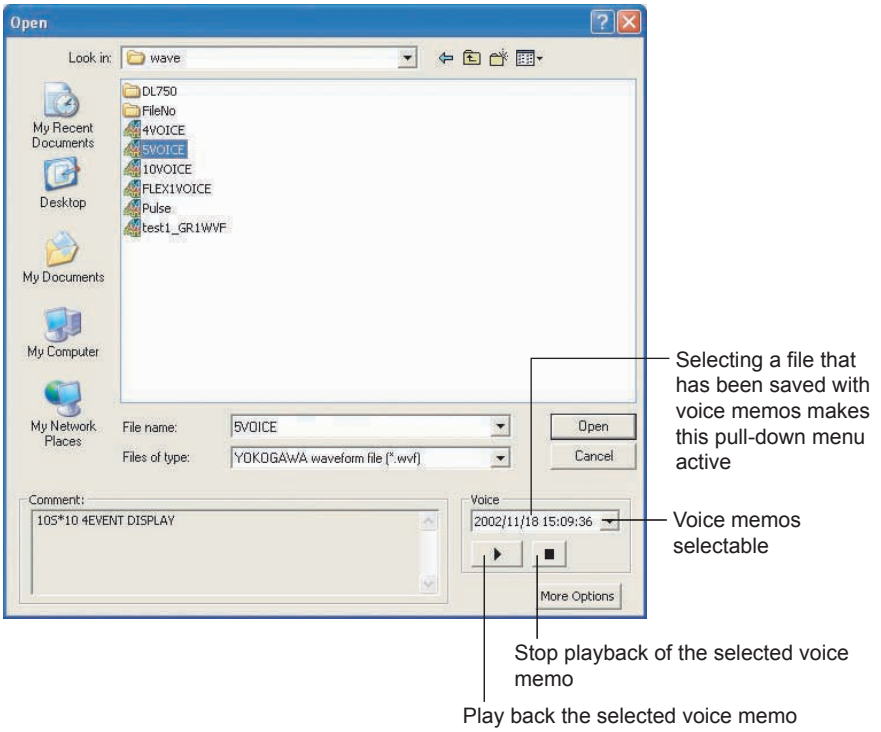
When opening a file with comments:

With the DL series, when you open a file that has been saved with comments, those comments appear in the Comment field of the dialog box.



When opening a file with voice memos:

With the DL750 series, when you open a file that has been saved with voice memos, those voice memos can be played back.



Note

If your PC does not have audio capabilities, the Play and Stop buttons are grayed out.

Explanation

Types of Files You Can Open with Xviewer

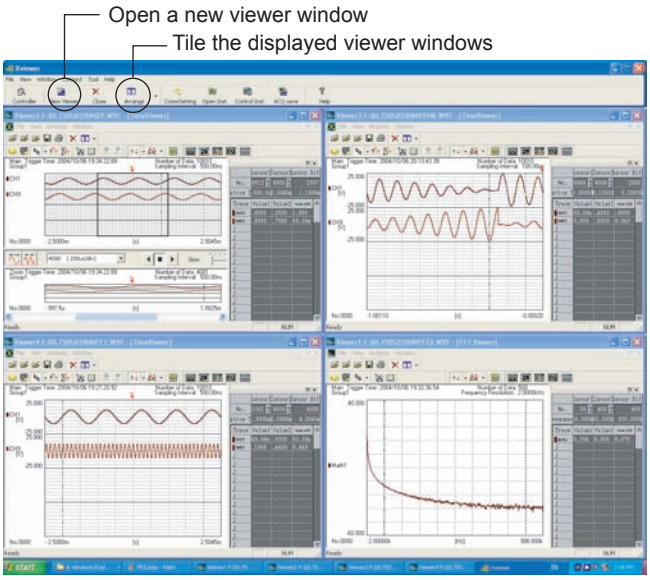
File Type	Extension
Measured waveform files saved on the DL1600 series, DL1700 series, DL1700E series, DL7400 series, DL750 series, SL1400, or WE7000	.wvf
Measured waveform files saved on the DL9000 series, SB5000 series, SL1000, DLM2000 series, DL6000/DLM6000 series or DL850/DL850V, Files saved with the real-time recording feature of DL750 series, SL1400, SL1000 or eDL850/DL850V	.wdf
ASCII files saved on the DL1600 series, DL1700 series, DL1700E series, DL7400 series, DL750 series, DL9000 series, SB5000 series, SL1400, WE7000, or DLM2000 series DL6000/DLM6000 series, DL850/DL850V	csv
Display setting files saved with Xviewer	.xml

Note

- To open a .wvf file, a header file (.hdr file) having the same name as the file you are trying to open must be placed in the same folder.
- Xviewer cannot simultaneously display waveforms that are captured with different measurement intervals, memory partitions (blocks), trigger points, or other conditions. If you attempt to load a file with waveforms that were measured under different conditions, an error message is displayed and the file is not loaded into Xviewer.
- Xviewer cannot simultaneously display the channels of waveforms measured with different sampling intervals, record lengths, or other conditions. If you attempt to load a file with waveforms that were measured under different conditions, an error message is displayed and the file is not loaded into Xviewer.
- Xviewer cannot load files with a trace name that includes a space. To load such a file, first replace the spaces in TraceName in the header file (.hdr file) with underscores (_) or other characters.
- Regarding the timestamp (trigger time) displayed in the file open dialog box or on the waveform screen when measured waveform files saved on DLM2000 series instruments of firmware version 1.05 or earlier are opened by Xviewer.
- In the case of waveform data having 1 history waveform, the displayed timestamp is the measurement start time (when the RUN/STOP key on the DLM2000 series main unit is pressed).
- In the case of waveform data having multiple history waveforms, the displayed timestamp differs from the time displayed on the DLM2000 series main unit.

Loading Multiple Files

A new Viewer window can be opened either by clicking the or selecting **Window > Viewer**. Multiple Viewer windows can be open at the same time, allowing you to read and display the contents of multiple files. When multiple Viewer windows are being displayed, you can tile them by clicking the or selecting **Window > Tile.**



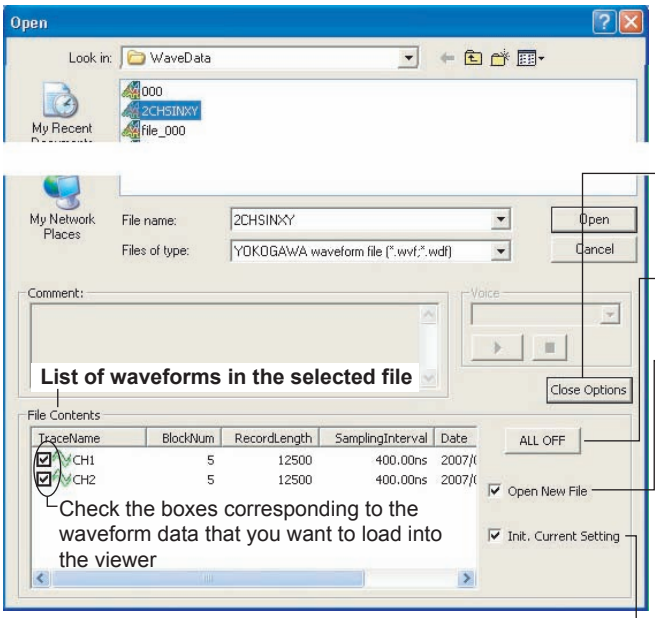
Files that can be dragged

The files with the following extensions can be dragged from the load source window onto the viewer window.

.wvf, .wdf, .csv

Setting Options for Loading Files

Click the **More Options** button to specify supplementary options for loading a file after selecting that file name.



Show or hide loading options

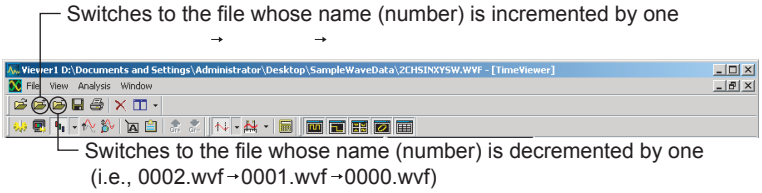
Prevent all waveform data from being loaded.

Open New File
Clears the currently displayed waveform data and loads new waveform data. Uncheck [TW1]the box to load new waveform data while keeping the current waveform displayed.

Init. Current Setting
Clears the current display conditions (vertical axis scale, waveform color, screen split, waveform parameters, and computation settings) and loads new waveform data. Uncheck the box to load new waveform data while keeping the current display conditions.

Loading Sequentially Numbered Files

Click either of the buttons shown below to load and display sequentially numbered files in the folder containing the file you are currently viewing, switching the files in ascending or descending order of file numbers.



Reference Files in the instruments

You can directly reference waveform data files saved into the media of the instruments and which are connected to Xviewer. For details, see Section 8.3.

Automatically Loading Display Settings

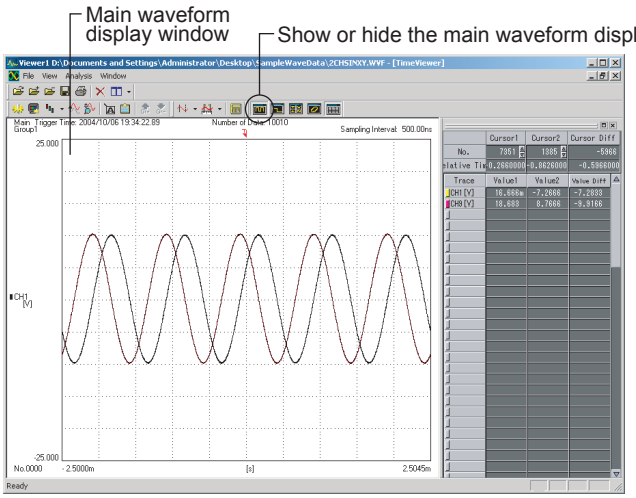
Waveform data is loaded, the corresponding display settings are automatically loaded. For automatic saving / loading of display settings, see section 5.5.

2.2 Displaying Waveforms in the Main View

Procedure

Displaying Waveforms in the Main View

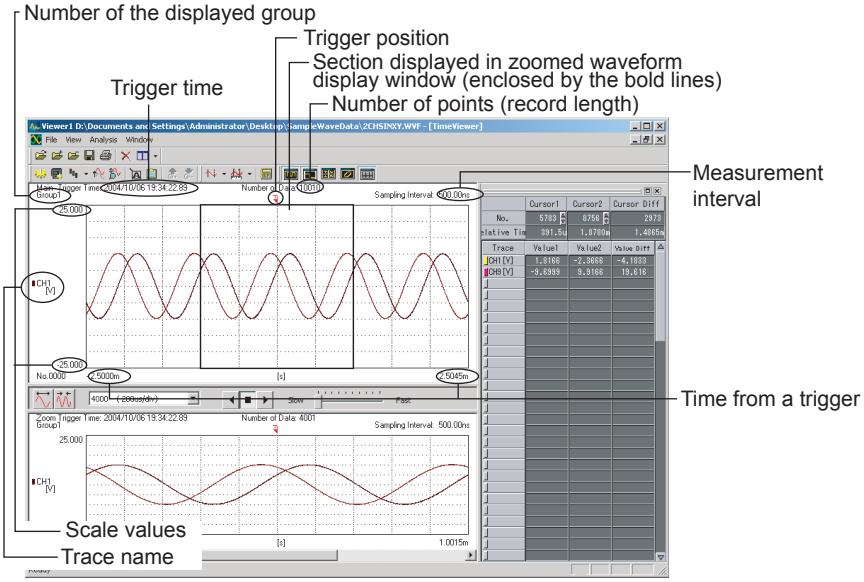
To display waveforms and measurement results, first open a waveform data file. To show or hide the main waveform display window, click the or select **Window > Main Window**.



Explanation

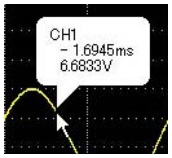
Details of the Main Waveform Display Window

The main waveform display window provides a global view of the waveform data.


Number of the displayed group
Trigger position
Section displayed in zoomed waveform display window (enclosed by the bold lines)
Trigger time
Number of points (record length)
Measurement interval
Time from a trigger
Scale values
Trace name

Displaying Tooltips

If you place the pointer on the waveform for about one second, the information for that point is displayed. For example, in the case of a time-voltage waveform, the time and voltage are displayed. The information is displayed for the main and zoomed waveforms. It is not displayed for history, XY, and logic waveforms.



2.3 Displaying Waveforms in a Zoomed View

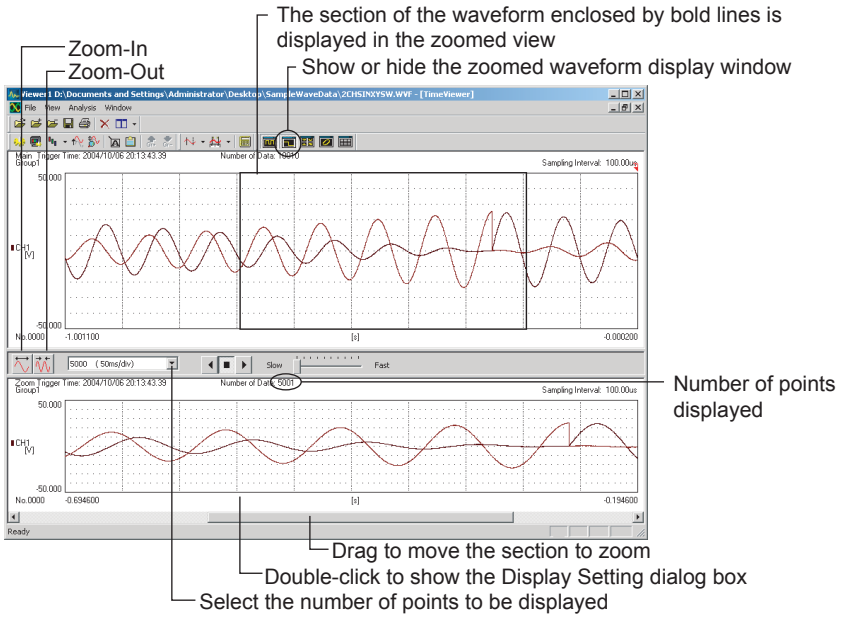
Procedure

Displaying Waveforms in a Zoomed View

Click the or select **Window > Zoom Window** to display a zoomed view of the section enclosed by the bold lines in the main waveform display window.

Setting the Zoom Factor

To increase or reduce the zoom factor, click the (Zoom-In) or (Zoom-Out).


The section of the waveform enclosed by bold lines is displayed in the zoomed view
Zoom-In
Zoom-Out
Show or hide the zoomed waveform display window
Number of points displayed
Drag to move the section to zoom
Double-click to show the Display Setting dialog box
Select the number of points to be displayed

Moving the Zoomed-In Section

You can move the section to zoom by:

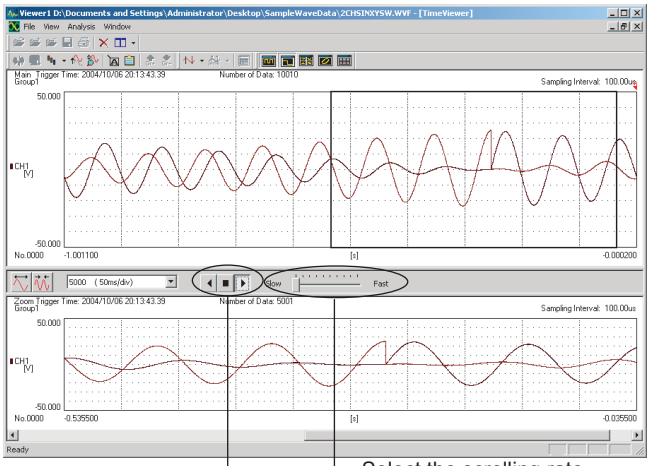
- **Dragging the bold line**
  You can drag the bold line in the main waveform display window to move the section to zoom. Use the arrow buttons to move it automatically.
- **Designating a point in the Display Setting dialog box**
  You can double-click the bottom of the zoomed waveform display window to show the Display Setting dialog box in which you can designate a point at which to start the zoomed section display. Click **OK** to apply the point.
- **Dragging the scroll bar**
  You can drag the scroll bar at the bottom of the zoomed waveform display window to move the section to zoom.

Scrolling Zoomed Waveforms

- **Arrow Buttons**
  To scroll the zoomed waveforms, click the ◀ or ▶ corresponding to the direction in which you want to scroll. The zoomed waveform view scrolls at the rate specified on the control bar.
- **Stop button**
  To stop scrolling, click the ■ .
  To resume scrolling, click the ◀ or ▶ again.

Note

Waveforms cannot be scrolled during measurement of waveform parameters or computation.



Explanation

Zoom Rate

The maximum zoom rate depends on the data being displayed. A view with 10 or fewer points cannot be zoomed.

Scrolling the Zoomed Waveform View

The zoomed waveform view can be scrolled automatically.
Use the following buttons to select the scrolling direction and rate:

- **Scrolling direction**
  ▶ : Scrolls to the right
  ◀ : Scrolls to the left
  ■ : Stops scrolling
- **Scrolling rate**
  Set one of the ten scrolling rates, from Slow to Fast.

Designating the Section to be Zoomed

To designate the point at which zooming is to start in the Display Setting dialog box, specify the value of the left most point of the zoomed section that you want to view. The values that can be specified vary with the zoom rate and displayed waveforms.
Inputting the number of data points: Input an integer to start display from that number of data points.
Inputting a time: In relative time display mode, input a real number to start display from that time. At this time, m (10^{-3}), u (10^{-6}), n (10^{-9}), and P (10^{-12}) can be used.
(Example)
1.23 → 1.23 s
1.23 m → 1.23 ms
1.23 E-3 → 1.23 ms
0.00123 → 1.23 ms

2.4 Displaying Waveforms in the History View

Procedure

Displaying Waveforms in the History View

Click the or select **Window > History Window** to open the history waveform display window.

Changing View Sizes

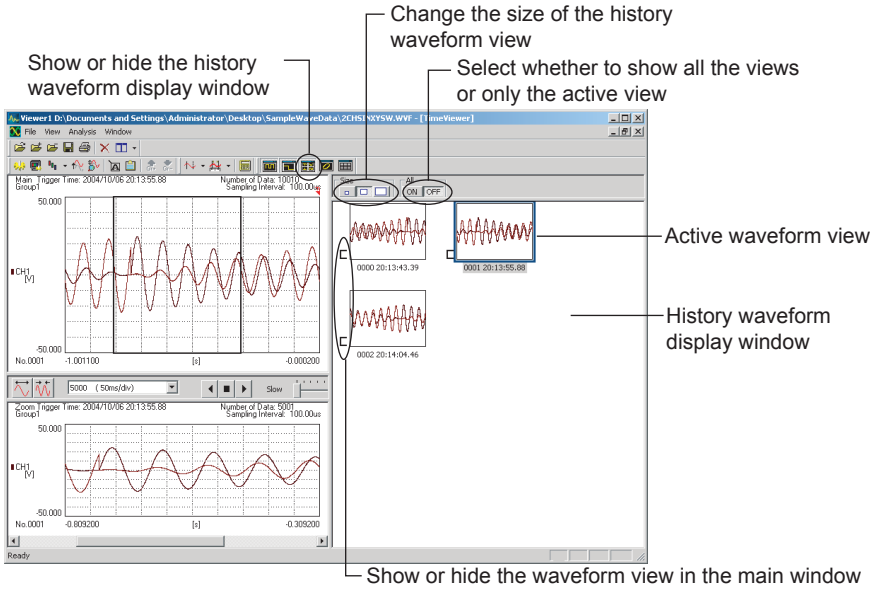
To change the size of the history waveform view, click the **Size** button corresponding to the size that you want to apply to the history waveform display window.

Selecting the History Waveforms to be Displayed

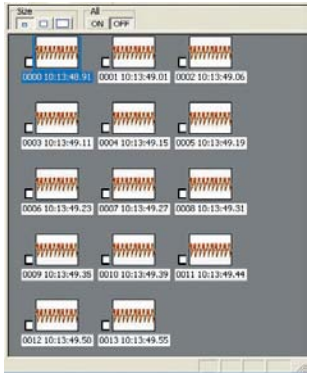
To display all the history waveforms in the main waveform display window, click **ON** for ALL.
To display only the active history waveforms in the main waveform display window, click **OFF**.
You can place a checkmark in the check box corresponding to individual history waveform views to select specific history waveform views to be displayed in the main waveform display window.

Making a History Waveform Active

To make a history waveform active in the main waveform display window, click the history waveform view. The history waveform view is enclosed by blue lines and its history waveform number is highlighted.
When other history waveform views are also displayed, the active history waveform view appears brighter than the others.


Change the size of the history waveform view
Show or hide the history waveform display window
Select whether to show all the views or only the active view
Active waveform view
History waveform display window
Show or hide the waveform view in the main window

Sample of minimum-size views



Explanation

Data That Can Be Loaded Using the History Waveform Display Window

The history waveform display window can display waveform records saved with the sequential store, single (N) trigger mode, and/or history waveform handling features of the DL series, SL1400, and SL1000.

Note

An error message will appear if there is insufficient memory.

Sizes of History Waveform Views

You can select one of three sizes for listing the history waveform views.

ALL ON/OFF

You can select whether to display all the history waveform views listed in the history waveform display window in the main waveform display window:

ON: Displays all the history waveform views in the main waveform display window.

OFF: Displays only the active history waveform view.

Active History Waveform View

- Cursor measurements can be applied to active history waveforms.
- The waveforms of the active view appear brighter in the main waveform display window.
- The number of the active view is highlighted in the history waveform display window.

2.5 Displaying a Waveform in the X-Y View

Procedure

Displaying a Waveform in the X-Y View

Click the or select **Window > X-Y Window** to display the X-Y waveform display window.

Selecting a Waveform to be Displayed in the X-Y view

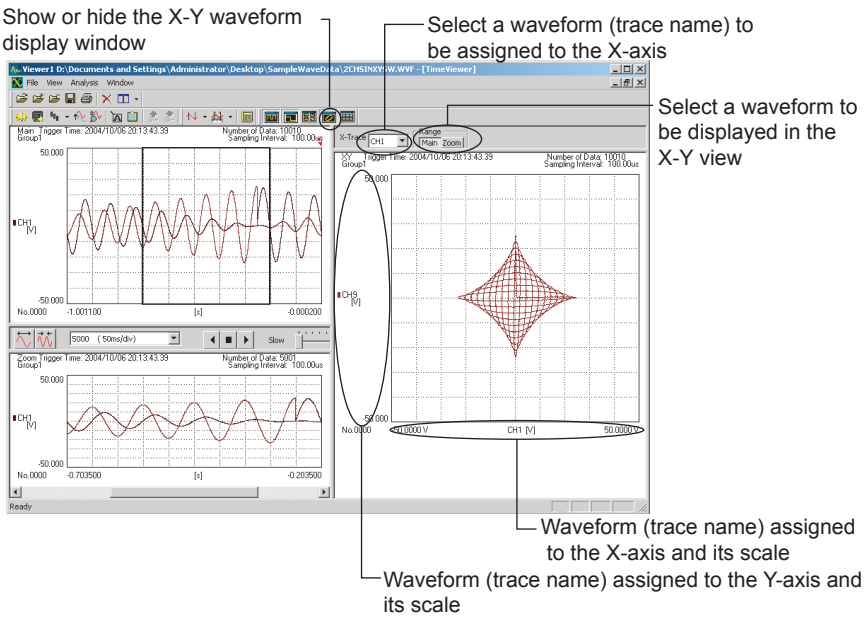
To see a waveform displayed in the main waveform display window in the X-Y view, click **Main** under Range.

To see a waveform displayed in the zoomed waveform display window in the X-Y view, click **Zoom** under Range.

Setting the X-Axis

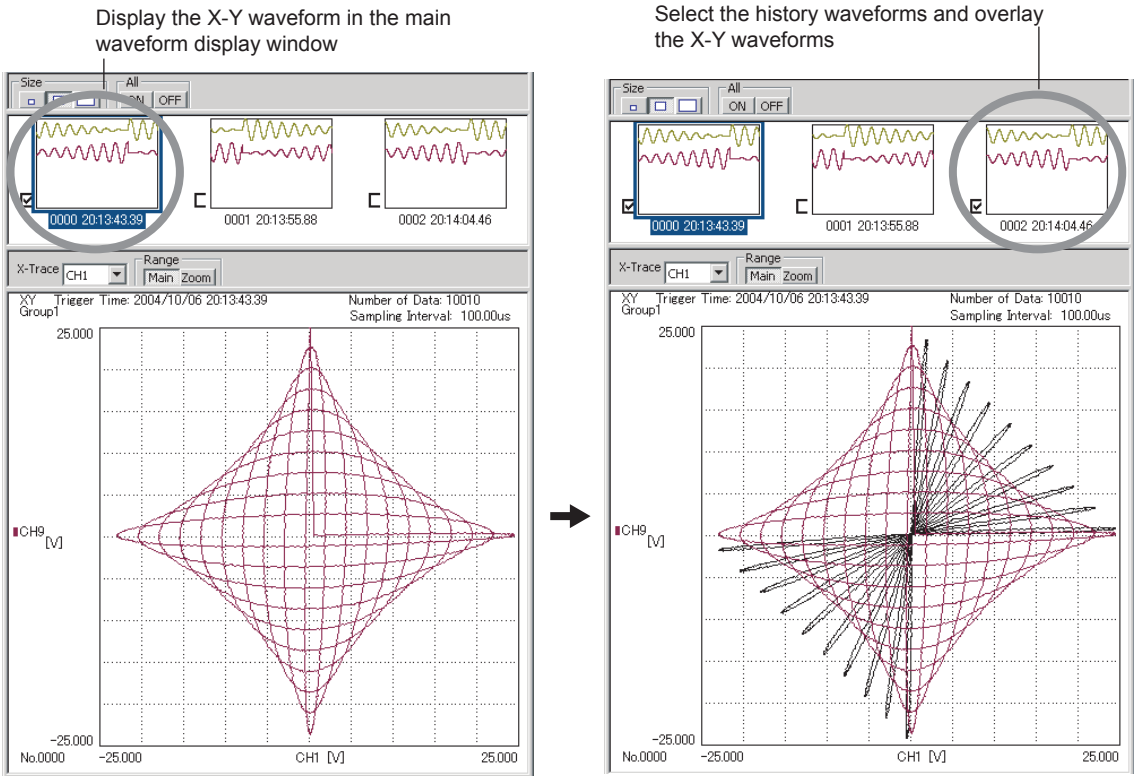
Select a waveform (trace name) to be assigned to the X-axis by using the X-Trace list box.

All waveforms other than that assigned to the X-axis are allocated to the Y-axis.


Show or hide the X-Y waveform display window
Select a waveform (trace name) to be assigned to the X-axis
Select a waveform to be displayed in the X-Y view
Waveform (trace name) assigned to the X-axis and its scale
Waveform (trace name) assigned to the Y-axis and its scale

Overlaying X-Y Waveforms

The active waveform in the history waveform window can be overlaid on the X-Y waveform display window. If Range is set to Main, the waveform in the main waveform display window is overlaid. If Range is set to Zoom, the waveform in the zoom waveform display window is overlaid.



Note

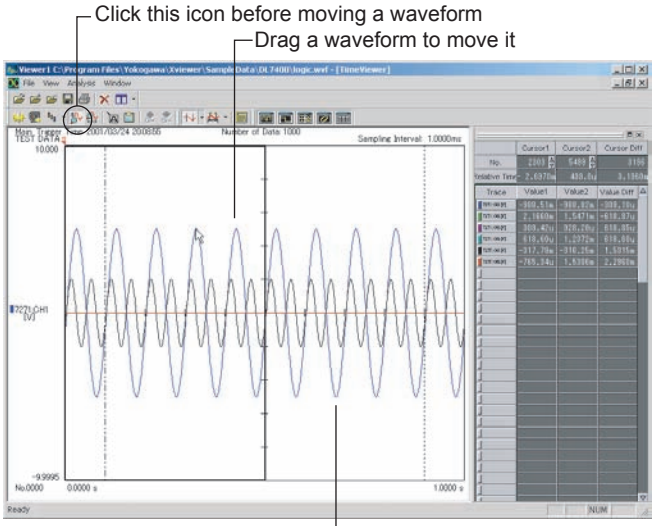
- The X-Y waveform display window plots P-P data displayed in the main, zoom, or history waveform display window into the X-Y view.
- The X-Y view of logic waveforms cannot be shown.

2.6 Moving or Zooming Waveforms

Procedure

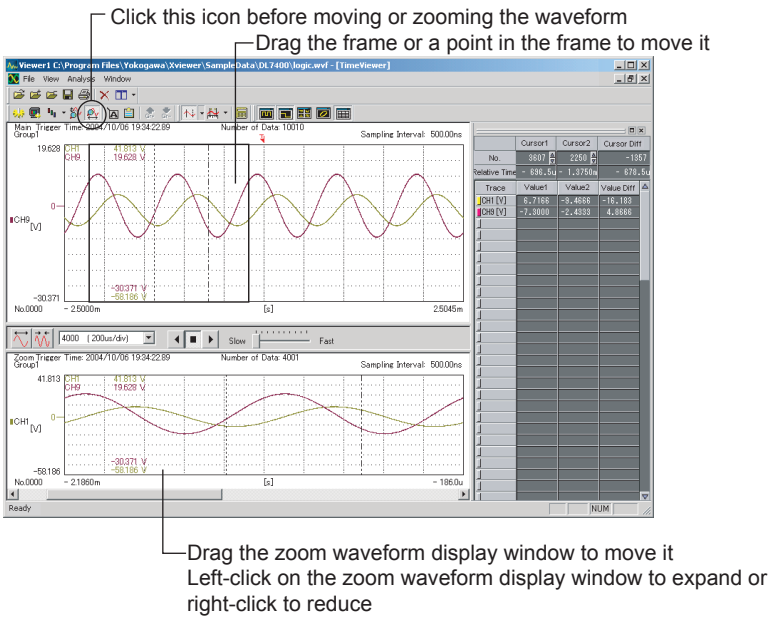
Moving or Zooming (Expanding/Reducing) the Waveforms Vertically

1. Click or select **View > Waveform Vertical Zoom&Move**.
2. Using the mouse, drag the waveform you want to move.
3. Click the waveform you want to expand. The selected waveform expands around the clicked point. Right-click the waveform to reduce the waveform around that point.


Click this icon before moving a waveform
Drag a waveform to move it
Left-click the waveform to expand
Right-click the waveform to reduce

Moving or Zooming (Expanding/Reducing) the Waveforms Horizontally

1. Click or select **View** > **Waveform Horizontal Zoom&Move**.
2. Drag the frame or a point in the frame in the main waveform display window or the zoom waveform display window.
3. Click on the main or zoom waveform display window to expand the zoom display waveform around the clicked point. Right-click the waveform to reduce the waveform around that point.


Click this icon before moving or zooming the waveform
Drag the frame or a point in the frame to move it
Drag the zoom waveform display window to move it
Left-click on the zoom waveform display window to expand or
right-click to reduce

Note

or View > Waveform Horizontal Zoom&Move is selectable only if the zoom waveform display window is displayed. For the procedure to display the window, see section 2.3.

Explanation

Applicable Windows

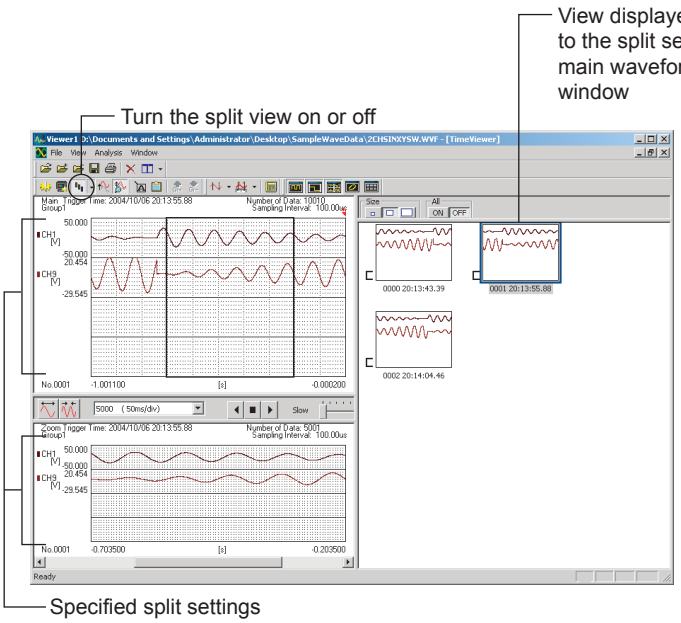
Move and zoom can be applied to the main or zoom waveform display window.

2.7 Splitting the Screen

Procedure

Splitting Waveforms by a Trace

Click the or select **View > Split** to overlap the waveforms in the main waveform display window or zoomed waveform display window, splitting them based on the trace name.


View displayed according to the split settings for the main waveform display window
Turn the split view on or off
Specified split settings

Explanation

Split Settings

The default value for the number of split waveforms depends on the number of waveforms that are automatically identified by Xviewer, and is used both for the main waveform display window and zoomed waveform display window. The default value can be changed using the split setting dialog box. Using this dialog box, you can specify different split settings for the main waveform display window and zoomed waveform display window or modify the default split settings. For details, see Section 3.3.

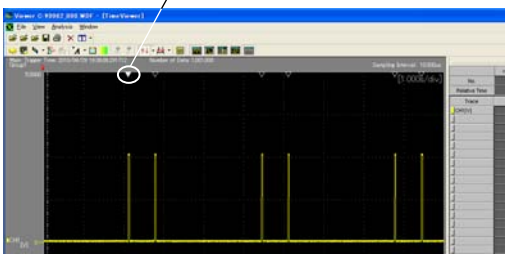
2.8 Displaying Waveforms Acquired with the DL850 Dual Capture Function (version 1.60 or later)

You can display the main and capture waveforms acquired with the DL850 Dual Capture function.

Procedure

Load data captured with the DL850's Dual Capture function according to the instructions in section 2.1, "Loading Waveform Data." The main waveform is displayed.
A triangle is displayed at the position of the capture waveform.

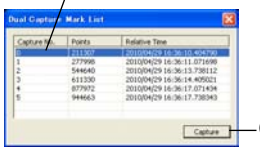
A triangle appears at the position of the capture waveform



Capture Waveform Display

1. Double-click the capture waveform mark, or click View > DualCapture List. The dual capture list is displayed.
2. Double-click the capture waveform to display, or select it and click the Capture Waveform button. The selected capture waveform is displayed.

Select the capture waveform to display

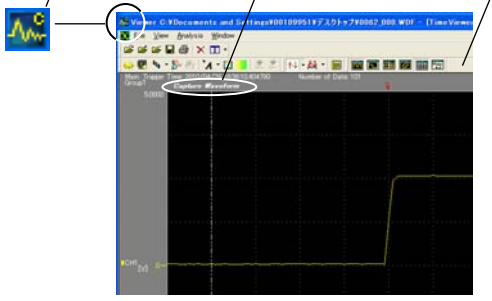


Click to display the selected capture waveform

Capture waveform

Appears when displaying a capture waveform

The "return to main waveform" icon



Returning to the Main Waveform

1. Click the "return to main waveform" icon, or click **View** > **Return to main waveform.** The main waveform is displayed.

Explanation

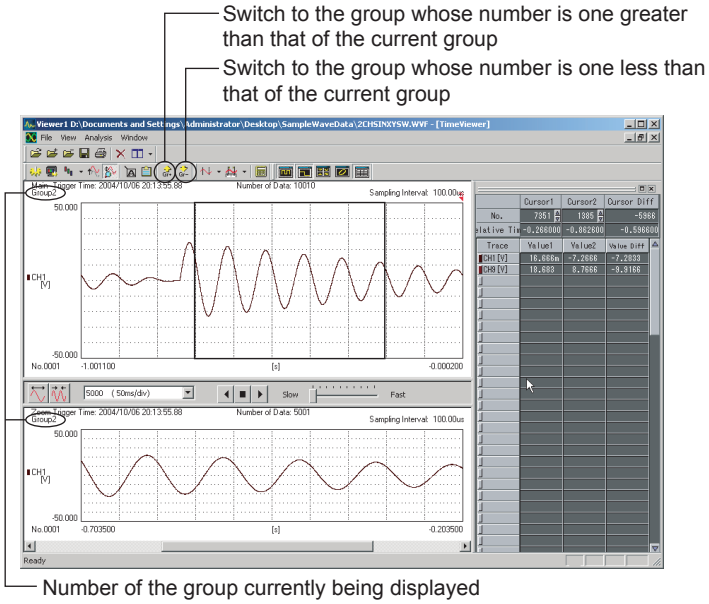
You can link, analyze, and display the main and capture waveforms acquired with the Dual Capture function.

2.9 Switching between Groups

Procedure

Switching between Groups

When you have already registered groups, you can switch between those groups either by clicking the or , or by selecting **View > Next Group/Previous Group.**


Switch to the group whose number is one greater than that of the current group
Switch to the group whose number is one less than that of the current group
Number of the group currently being displayed

Auto Group Setting

Click **View > Auto Group Setting** to open the screen below.
Enter the number of channels in a group.

Explanation

Grouping Channels

In the Channel Setting dialog box, you can be grouping by trace name. In addition, the specified number of channels can be automatically allocated to a single group. For details, see Section 3.2.

Note

If there are no groups, the and are unavailable (no operation even if they are clicked).

Set Auto Group

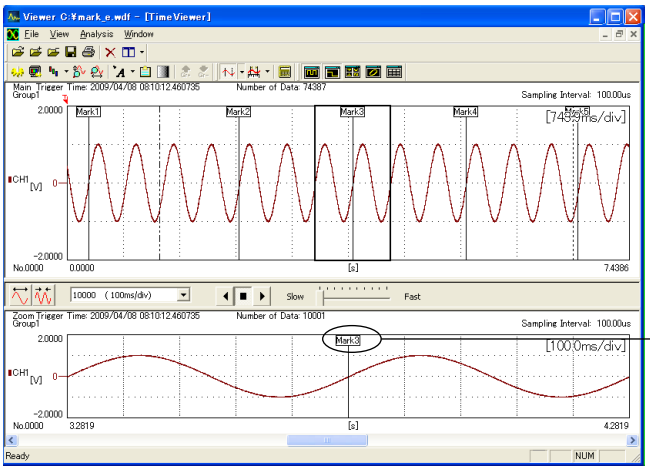
Enter a value in the **Number of Channels in Group** box and click **OK** to automatically assign the specified number of channels to a single group. For example, if you enter 30, channels are assigned as follows: CH1 to CH30 to group1, CH31 to CH60 to group 2, and so on. If you select the **Initialize Channel Setting** check box and click **OK**, channel settings such as the ON/OFF condition of the display, scale, and waveform color are initialized.

2.10 Showing Marks

Procedure

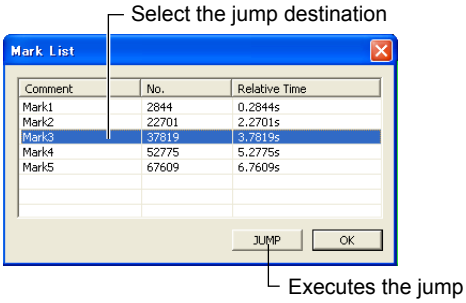
Showing Marks

Click **View** > **Show Marks**. The marks are displayed.



Mark List and Jump

Click **View > Mark list**. The screen below appears. Select a jump destination, then click Jump. The selected mark is displayed in the center of the zoom waveform window.



Explanation

Showing Marks

Marks are displayed when loading waveform data from mark files (extension: .mrk). Also, you can display previously set marks in a list, and jump to any mark you specify. This function is available with waveform data on which marks have been set using version 2.10 or later of the SL1000 acquisition software.

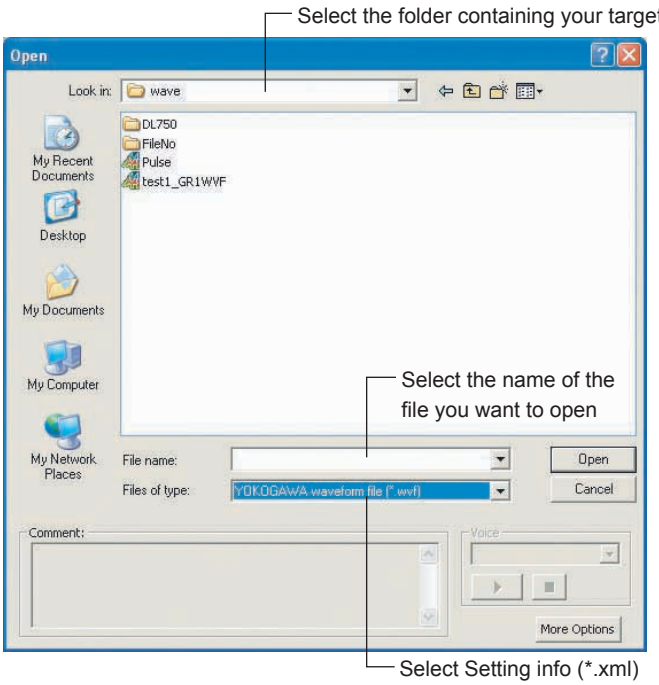
3.1 Loading Display Settings

The display conditions specified on the current viewer window can be saved in XML format. You can also include comments when saving the file.
If you load the display conditions that you created, the conditions are applied to the current viewer window. For the procedure to create and save the display conditions, see section 5.5.

Procedure

Loading Display Settings

Click or select **File > Open** to display the Open File dialog box. Select **Setting info (*.xml)** in Files of type, browse to the folder containing your target file, select the name of the file you want to open, and then click the **Open**. The display settings are loaded from the file into the viewer window.



Explanation

Application of Display Settings

Loading a Display Setting file already saved applies the display settings in the file to waveform views. Chapter 3 Specifying Display Settings for Waveform Data

3.2 Setting Waveforms (Channels) to be Displayed

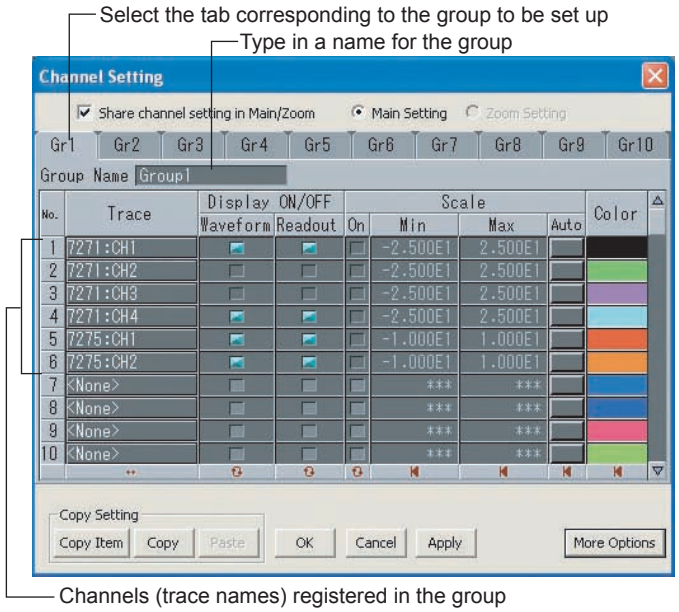
Procedure

Displaying the Channel Setting Dialog Box

Click he or select **View > Channel** Setting to display the Channel Setting dialog box. Using this dialog box, you can specify the display and group settings for the respective channels.

Grouping Channels

You can group the channels (trace names) to be registered. You can handle waveform display settings in units of groups.



Setting Up Channels (Traces)

Set up the channels (traces) for each channel number. Click a trace name to display the Channel dialog box, and then select a channel (trace name) from the dialog box.

Specifying whether to Show or Hide Waveforms and Cursor Measurement Values

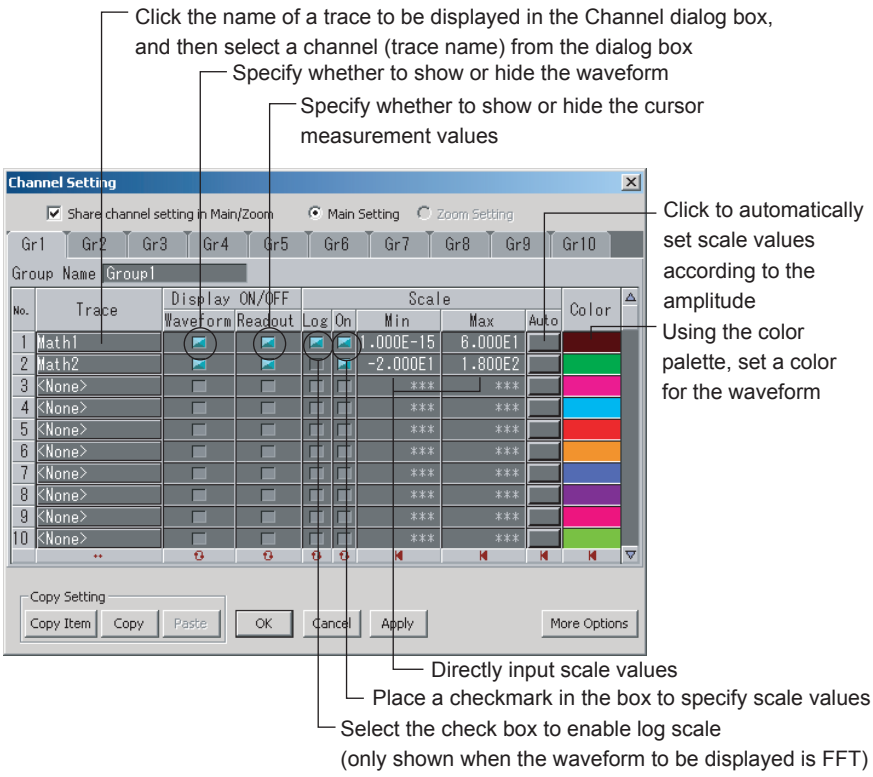
Specify whether to show or hide the waveform and cursor measurement values for each channel number.

Setting Scales

Set the scale values for each channel number.

Setting Waveform Colors

Using the color palette, set the waveform colors for each channel number.


Click the name of a trace to be displayed in the Channel dialog box, and then select a channel (trace name) from the dialog box
Specify whether to show or hide the waveform
Specify whether to show or hide the cursor measurement values
Click to automatically set scale values according to the amplitude
Using the color palette, set a color for the waveform
Directly input scale values
Place a checkmark in the box to specify scale values
Select the check box to enable log scale (only shown when the waveform to be displayed is FFT)
Channel Setting
Share channel setting in Main/Zoom
Main Setting
Zoom Setting
Gr1 Gr2 Gr3 Gr4 Gr5 Gr6 Gr7 Gr8 Gr9 Gr10
Group Name Group1
No. Trace Display ON/OFF Waveform Readout Scale Log On Min Max Auto Color
1 Math1 1.000E-15 6.000E1
2 Math2 -2.000E1 1.800E2
3 <None>
4 <None>
5 <None>
6 <None>
7 <None>
8 <None>
9 <None>
10 <None>
Copy Setting
Copy Item Copy Paste OK Cancel Apply More Options

Specifying Waveform Mapping Manually

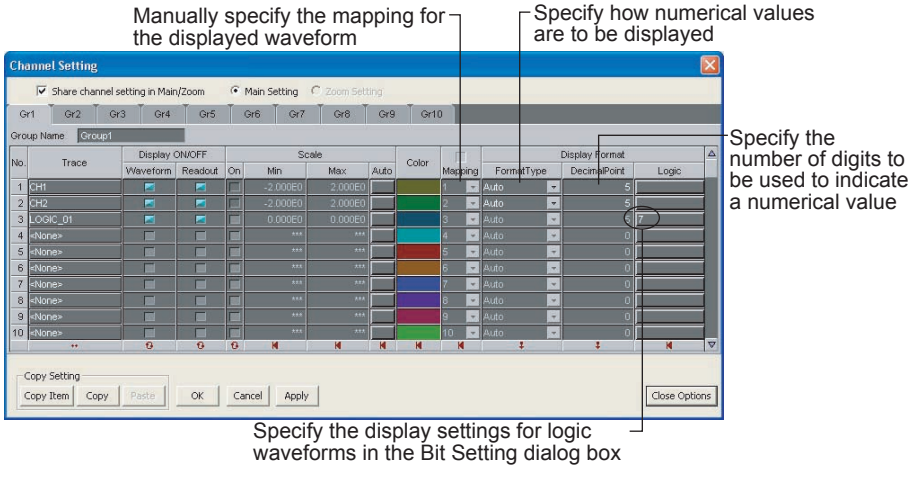
Click **More Options** to expand the dialog box.

For each channel, you can manually specify in which screen (when the viewer window is split) to display waveforms using mapping numbers 1 to 16. Select the Mapping check box to apply the manually specified waveform mappings.

For example, if there are 4 splits and the mapping number is 10, the waveform is displayed in the second screen from the top. When 10 is divided by 4, the remainder is 2. This “2” indicates the second split screen. If the remainder is 0, the waveform is displayed in the bottom-most screen.

Setting Notational Formats

Click **More Options** to expand the dialog box. You can specify how numerical values are to be displayed and the number of digits to be used to indicate a numerical value in the viewer window, as well as specify the display settings for the logic waveforms in the fields.


Manually specify the mapping for the displayed waveform
Specify how numerical values are to be displayed
Specify the number of digits to be used to indicate a numerical value
Specify the display settings for logic waveforms in the Bit Setting dialog box
Channel Setting
Share channel setting in Main/Zoom
Main Setting
Zoom Setting
Gr1 Gr2 Gr3 Gr4 Gr5 Gr6 Gr7 Gr8 Gr9 Gr10
Group Name Group1
No. Trace Display ON/OFF Waveform Readout Scale On Min Max Auto Color Mapping Display Format FormatType DecimalPoint Logic
1 CH1
2 CH2
3 LOGIC_01
4 <None>
5 <None>
6 <None>
7 <None>
8 <None>
9 <None>
10 <None>
Copy Setting
Copy Item Copy Paste OK Cancel Apply Close Options

Explanation

Channel (Trace Name) Settings Shared

Channel (trace name) settings are shared by the main waveform display window and the zoomed waveform display window. The cursor measurement value is used as the main waveform display setting.

To apply different channel settings to each of the windows, remove the check mark from **Apply Channel Settings in both Main/Zoom**, place a check mark in **Main Window** or **Zoom Window**, and then make the individual channel (trace name) settings.

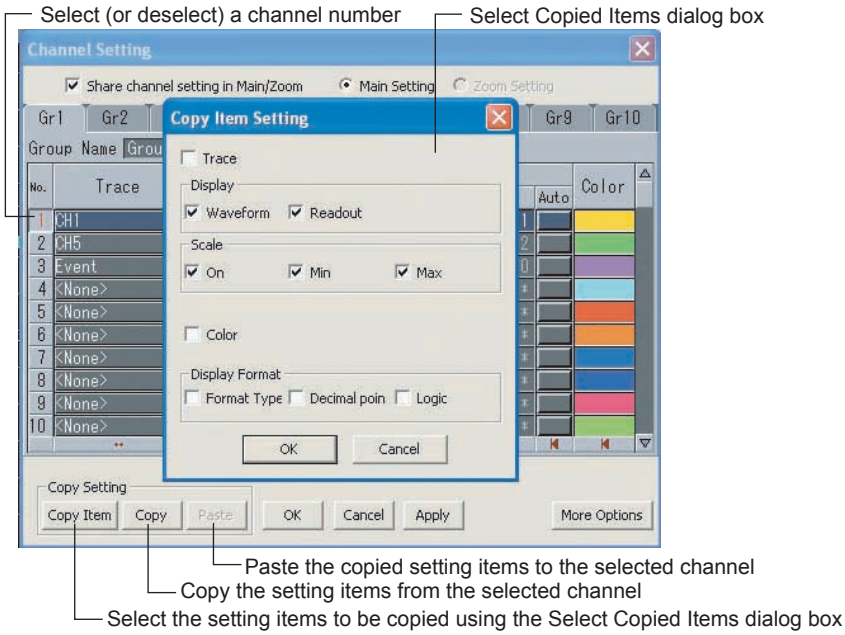
Number of Groups and Number of Channels (Traces) that Can Be Registered

Xviewer lets you create up to 10 channel (trace name) groups. You can register up to 90 channels per group.

Setting Items to Copy and Paste

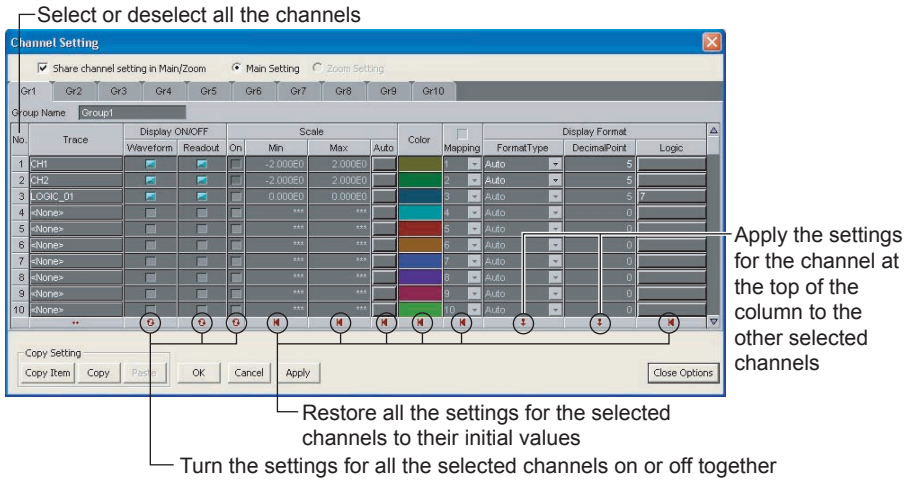
Xviewer lets you copy the settings for a channel (trace) selectively and then paste those settings to another channel. After pressing the **Copy Item** to display the Select Copied Items dialog box, you can define the setting items that you want to copy in advance.

The Select Copied Items dialog box is also displayed when you execute a paste command,allowing you to remove any unnecessary setting items and paste only those which are required.



Changing All Settings Together

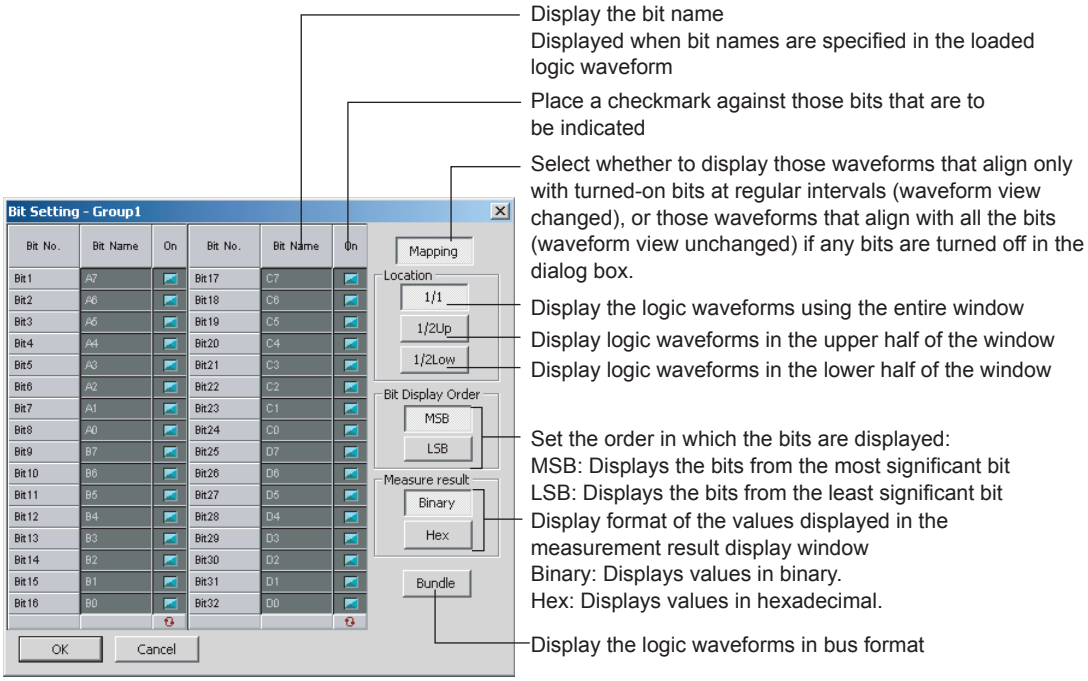
The Channel Setting dialog box provides buttons that allow you to select and change all the settings together.



Notational Format Items

You can specify the following notational format items:

- Format Type: Select **Auto Floating Point** , or **Exponential**
  Selecting either **Floating Point** or **Exponential** causes the following data to be displayed in the viewer windows, using the selected type of notation:
  Scale Values, Values of Cursor Measurement, and Waveform Parameters (Amplitude Maximum, Minimum, High Level, Low Level, Peak to peak value, Average, Middle, RMS, Int1TY, and Int2TY)
- Decimal Point: Specify the number of decimal places to be displayed for both the floating point and exponential notations.
- Logic :Specify the display settings for the logic waveforms in the Bit Setting dialog box. Specify to display up to 32 bits for the DL9700 series, and SB5000 series, up to 16 bits for the DL9500, DL750, and SL1400 series, and up to 8 bits for the DL7400 series DLM2000 series, and DL850/DL850V.


Bit Setting - Group1
Bit No.
Bit Name
On
Mapping
Location
1/1
1/2Up
1/2Low
Bit Display Order
MSB
LSB
Measure result
Binary
Hex
Bundle
OK
Cancel
Display the bit name
Displayed when bit names are specified in the loaded logic waveform
Place a checkmark against those bits that are to be indicated
Select whether to display those waveforms that align only with turned-on bits at regular intervals (waveform view changed), or those waveforms that align with all the bits (waveform view unchanged) if any bits are turned off in the dialog box.
Display the logic waveforms using the entire window
Display logic waveforms in the upper half of the window
Display logic waveforms in the lower half of the window
Set the order in which the bits are displayed:
MSB: Displays the bits from the most significant bit
LSB: Displays the bits from the least significant bit
Display format of the values displayed in the measurement result display window
Binary: Displays values in binary.
Hex: Displays values in hexadecimal.
Display the logic waveforms in bus format

Apply Button for Confirmation

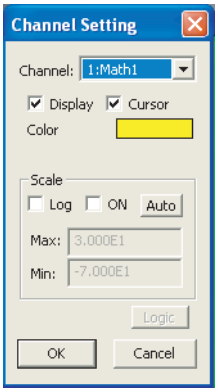
Clicking the **Apply** after you have changed the settings applies the previously specified settings to the window(s) while keeping the display setting screen displayed.

Note

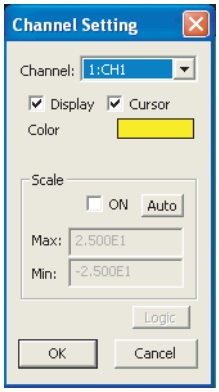
If you double-click the scale display area of the vertical axis, a channel setting window (simplified version) appears as shown below.

On this window, you can turn OFF the display or set the scale for channels that have been turned ON in advance on the channel setting window of page 3-2.

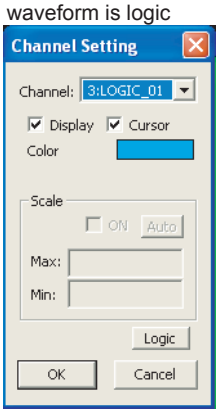
When the displayed waveform is FFT



When the displayed waveform is not FFT



When the displayed waveform is logic



Cursor Data Display Method (Measure Result)

The measured values can be displayed in binary or hexadecimal notation.

Binary: Displays values in binary notation.

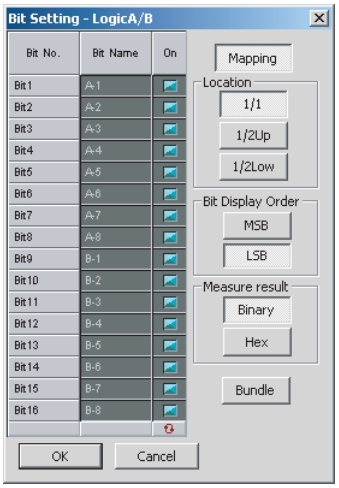
Hexa: Displays values in hexadecimal notation.

The data of the logic probe (Pod A, Pod B, Pod C, and Pod D) can be combined and handled as 32-bit data at maximum. If an OFF bit is present, the bit is displayed as a hyphen in binary display. The bit is considered to be not present in hexadecimal display.

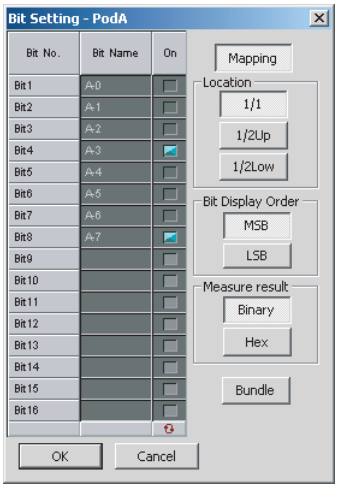
Cursor Data Order (Bit Display Order)

You can select the order of the bits of the logic probe. Select MSB to select bit 7 to bit 0 order; select LSB to select bit 0 to bit 7 order. In addition, the displayed order and number vary depending on the model as follows:

DL750 Series
DL850/DL850V

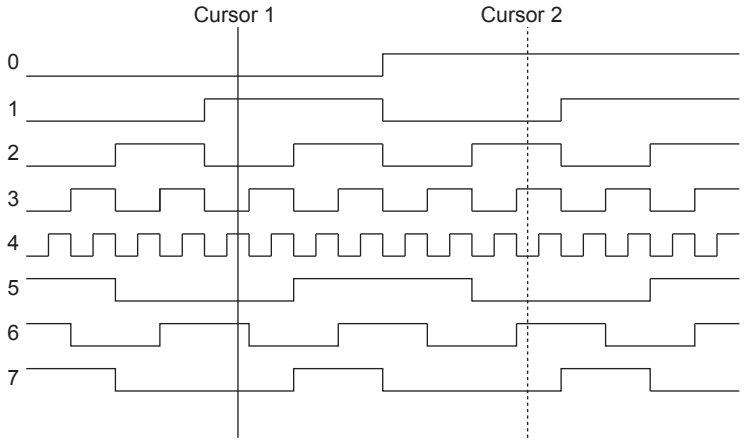


DL7400 Series
DLM2000 series



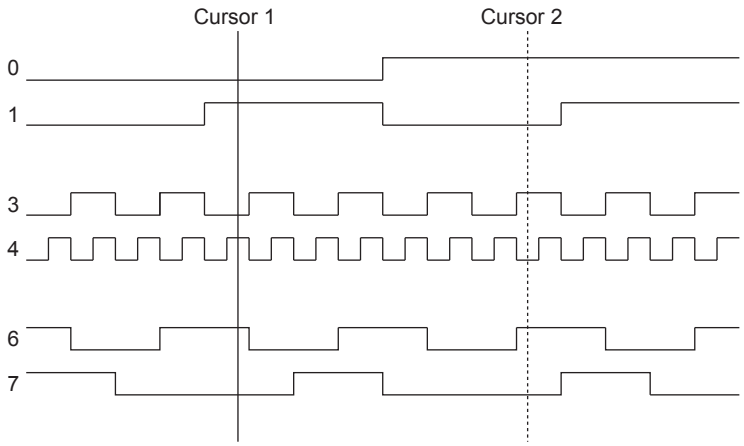
DL9500, DL9700 , SB5000 Series DL6000/DLM6000

Cursor Measurement Example (for V Cursor)



For the case above, if the data bit order is A0 to A7 B0 to B7
Binary Y1: 01001010 Y2: 10110010
Hexa Y1: 4A Y2: B2
If B7 to B0 A7 to A0
Binary Y1: 01010010 Y2: 01001101
Hexa Y1: 52 Y2: 4D

If OFF bits are present, the data is displayed as follows:



If A0 to A7 B0 to B7
Binary Y1: 01*01*10 Y2: 10*10*10
Hexa Y1: 16 Y2: 2A
If B7 to B0 A7 to A0
Binary Y1: 01*10*10 Y2: 01*01*01
Hexa Y1: 1A Y2: 15

Note

If Bundle is set to ON, the individual bit displays cannot be turned OFF.

3.3 Specifying Split Settings

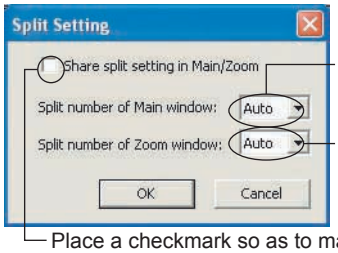
Procedure

Displaying the Split Settings Dialog box

Click ▼ beside the or select **View > Split Setting** to display the Split Setting dialog box.

Specifying Split Settings

In the Split Setting dialog box, specify whether to allow the main waveform display window and zoomed waveform display window to share the split settings and the number of waveform splits in the respective windows, and then click **OK**. The split settings that you have specified are applied to the window(s).



Select the number of waveform splits in the main waveform display window

Select the number of waveform splits in the zoomed waveform display window

Place a checkmark so as to make the main waveform display window and zoomed waveform display window share the split settings

Explanation

Number of Waveform Splits that Can Be Specified

For each of the main waveform display window and the zoomed waveform display window, you can specify Auto or any value between 1 and 16. Auto sets the number of waveform splits according to the number of waveforms to be displayed.

Waveform Mapping

When the screen is split, waveforms are mapped in order of channel number, starting from the top-most split screen. You can also specify arbitrary waveform mappings. For instructions on specifying arbitrary mappings, see section 3.2.

Split Settings for the History Waveform Display Window

Split settings made for the main waveform display window are also applied to the history waveform display window.

3.4 Specifying Display Settings

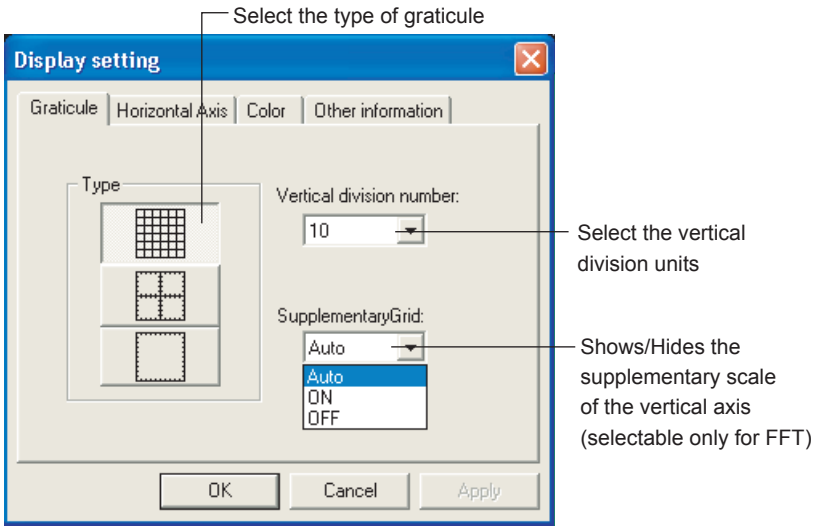
Procedure

Displaying the Display Setting dialog box

Click or select **View > Display Setting** to open the Display Setting dialog box. Within the Display Setting dialog box, you can make display settings on the Graticule, Horizontal Axis, and Colors tabs.

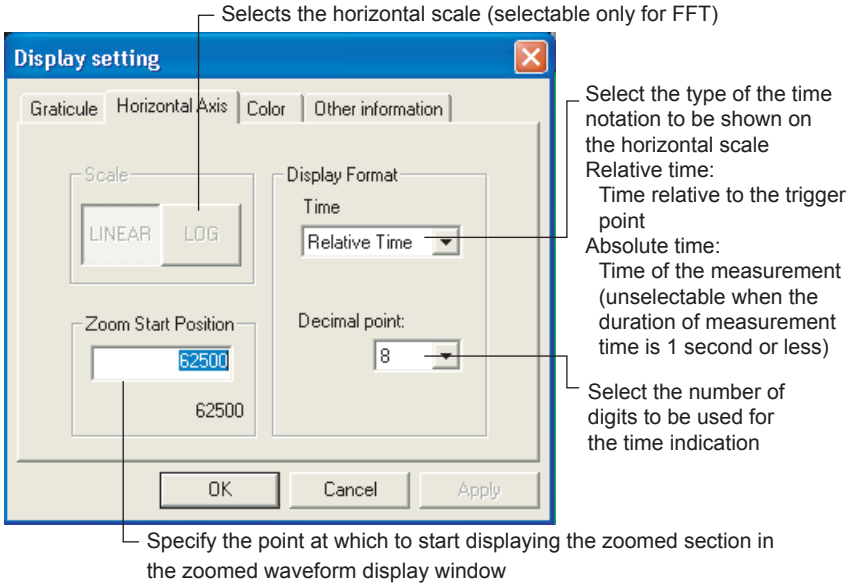
Making a Graticule Setting

Click the **Graticule** tab in the Display Setting dialog box. The Graticule pane appears. Using this pane, you can specify the graticule type and the units of the divisions on the vertical axis.



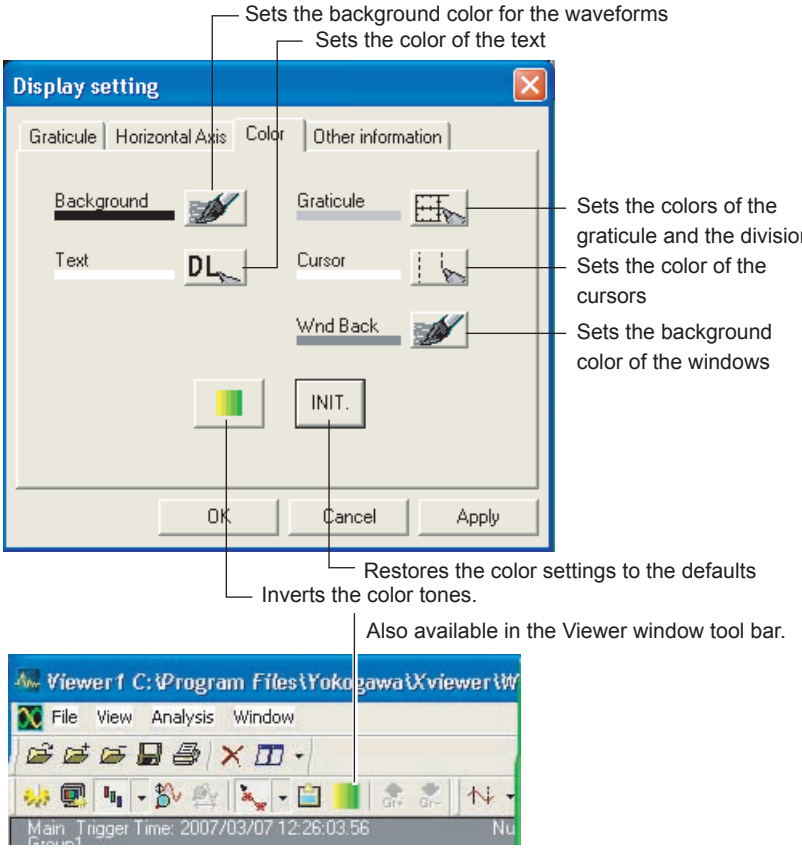
Setting the Horizontal Axis

Click the **Horizontal Axis** tab in the Display Setting dialog box to display the Horizontal Axis pane. Using this pane, you can specify the point at which to start displaying the zoomed section, as well as the notational format for the horizontal axis.



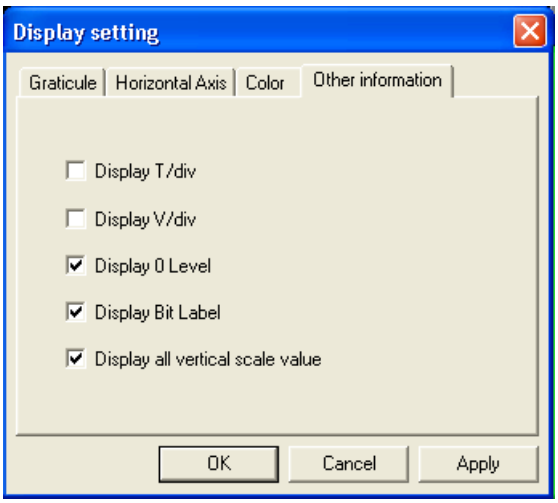
Setting the Colors

Click the **Colors** tab in the Display Setting dialog box to display the Colors pane. In this pane, you can specify the colors for the background, graticule, and text using the color palette.



Displaying Scale Information in the Waveform Display Window

Click the **Other Information** tab of the display settings dialog box to display the ON/OFF setting screen for the T/div, V/div, 0 Level, Bit Label, and all vertical scale value display. Select the check box of the desired items to display the respective information in the waveform display window.



Note

You can also double-click the scale display area of the horizontal axis to open the Display Setting dialog box.

Explanation

Setting the Grid

- Supplementary Grid
  The supplementary grid can be selected only when the FFT computation waveform is displayed.
  - Auto: Automatically determines whether to display the supplementary scale on the vertical axis.
  - ON: Displays the supplementary scale on the vertical axis.
  - OFF: Does not display the supplementary scale on the vertical axis.

Setting the Horizontal Axis

- Display Format
  Sets the time type (relative or absolute) and the number of displayed digits. However, the Display Format settings do not appear when the FFT computation waveform is displayed.
- Zoom Start Position
  When relative times are being displayed, the settings vary depending on whether an integer or a real number is input.
  Integer input: Start data position
  Real number input: Start time (auxiliary units m, n, u□ , and P can be input.)
- Scale
  Set the horizontal scale to LINEAR or LOG. The horizontal scale can be selected only when the FFT computation waveform is displayed.

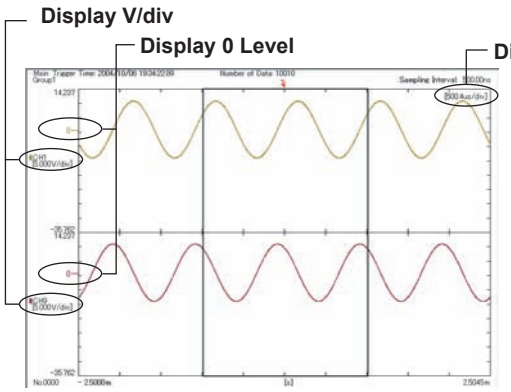
Setting the Color

You cannot change the waveform colors in the Display Setting dialog box. To change colors of the waveforms, use the Channel Setting dialog box. For details, see Section 3.2.

- Changing the color tone
  Clicking the Color Set button makes the appropriate color settings for monochrome printing. To restore the color settings, click the Color Set button again.
- INIT.
  Initializes the color settings to the default condition.

T/div, V/div, and 0 Level Display

You can display T/div, V/div, and 0 Level in the waveform display window. The values of the selected items are displayed. If multiple waveforms are displayed in the waveform display window, the V/div and 0 Level of the active waveform are displayed.

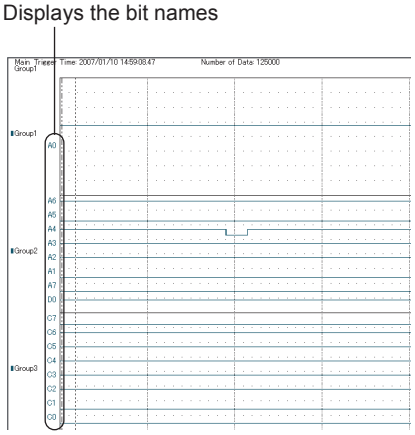


Display T/div
You can change the T/div character size. Click the T/div value, then drag the square. (Not available in Annotation mode. For information on Annotation mode, see section 4.5.)

Displaying the Bit Label

You can display the bit names of the logic waveform in the waveform display window.

Displays the bit names



Note

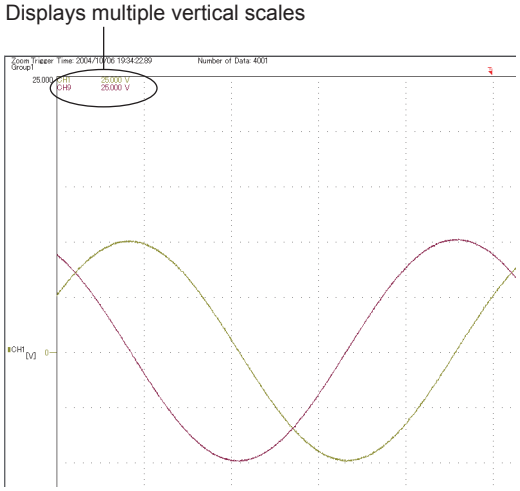
If the display area of the waveform display window is narrow, the bit label is not displayed. Carry out the following to display the bit label.

- Drag and expand the waveform display window vertically.
- Reduce the number of screen divisions.

Displaying the Multiple Vertical Axes

If multiple waveforms are displayed in the waveform display window, the range of the vertical axis of each displayed waveform can be displayed.

Displays multiple vertical scales



Note

Multiple vertical axes are not displayed if only a single waveform is shown in the waveform display window.

Checking the Changed Settings

Clicking the **Apply** while you are changing settings applies the settings you have already made for the window(s) to the waveform display, without closing the Display Setting dialog box.

Note

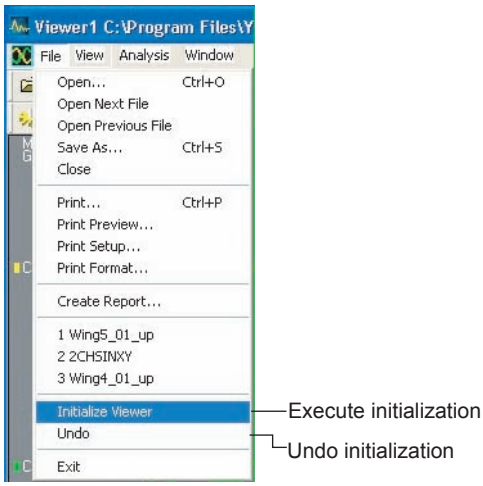
The Supplementary Grid of the Graticule tab and the Scale of the Horizontal Axis tab can be set only on Xviewer with the computation option if the horizontal axis unit is Hz.

3.5 Initializing Display Settings

Procedure

Executing Initialization

Click **File > Initialize Viewer** to return display conditions to their initial settings.



Undoing Initialization

Click **File > Undo** to restore the settings prior to the initialization.

Explanation

Initialization

Returns various kinds of specified display conditions to the settings immediately after loading the waveform data. This is useful when you wish to cancel all settings previously entered, or wish to reenter settings from the beginning.

Undoing Initialization

If you use the Undo command, the settings prior to the initialization are restored.

Initialized Items

The main items initialized are the following.

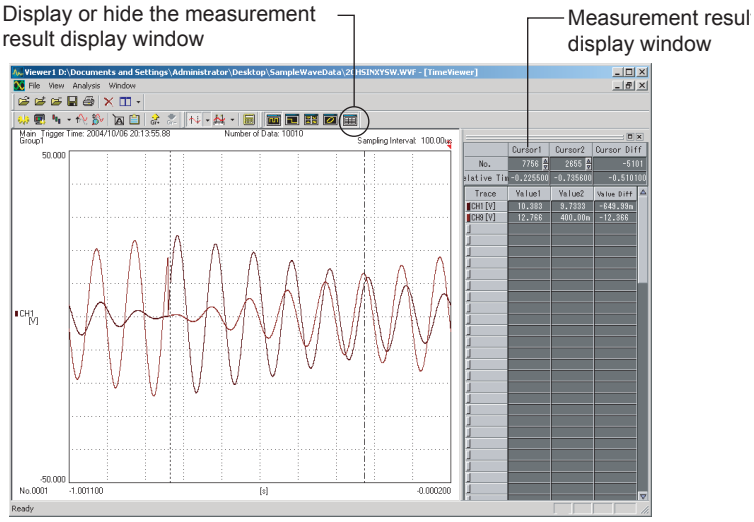
- Waveform color
- Color of the background, text, graticule, cursor, and window background
- Vertical axis scale values
- Logic signal display bit
- Number of screen divisions
- Sizes of windows
- Displayed windows (two: the main waveform display window and measurement result display window)
- Zoom position and zoom ratio
- Graticule type
- H and V cursor positions
- Horizontal and vertical axis display format
- Waveform parameter measurement items
- Computation filter, number of FFT computation points, time window, and user-defined computational expressions
- Deletion of all annotations

4.1 Displaying Measurement Results

Procedure

Displaying Measurements in the Result View

Open a waveform data file for which waveforms and measurement results are to be displayed. To display or hide the measurement result display window, click the or select **Window > Measure Result.**



Explanation

Items and Measured Values That Are Displayed

The items and measured values that are displayed depend on the measurements and waveforms.

Reference to Cursor Positions

The positions of the cursors are indicated using either of the references below, according to the notational format of the horizontal axis:

- Absolute time: The positions of cursors are indicated as absolute times.
- Relative time: The positions of cursors are indicated as being relative to the trigger position.

Note

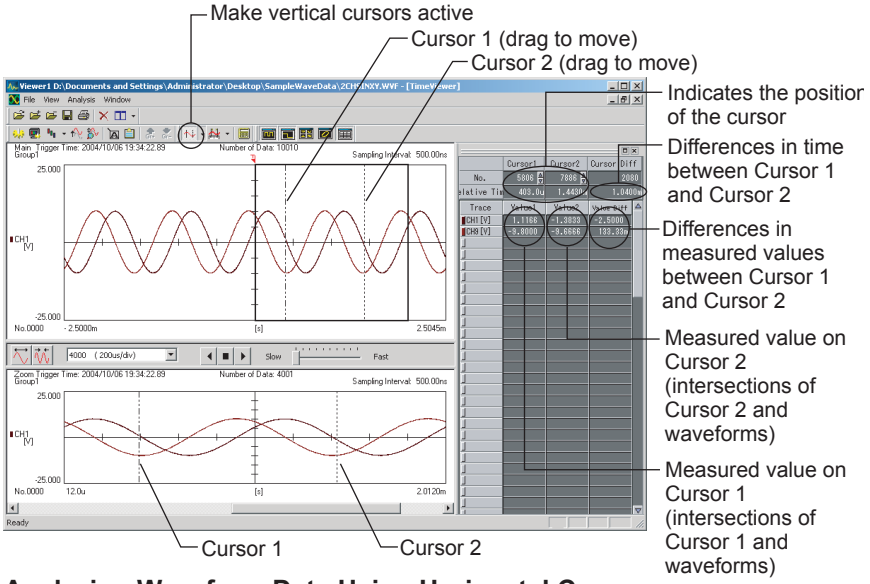
If you perform cursor measurement or automatic measurement of waveform parameters without the measurement results display window being displayed, the measurement results window is automatically displayed.

4.2 Analyzing Waveform Data Using Cursors

Procedure

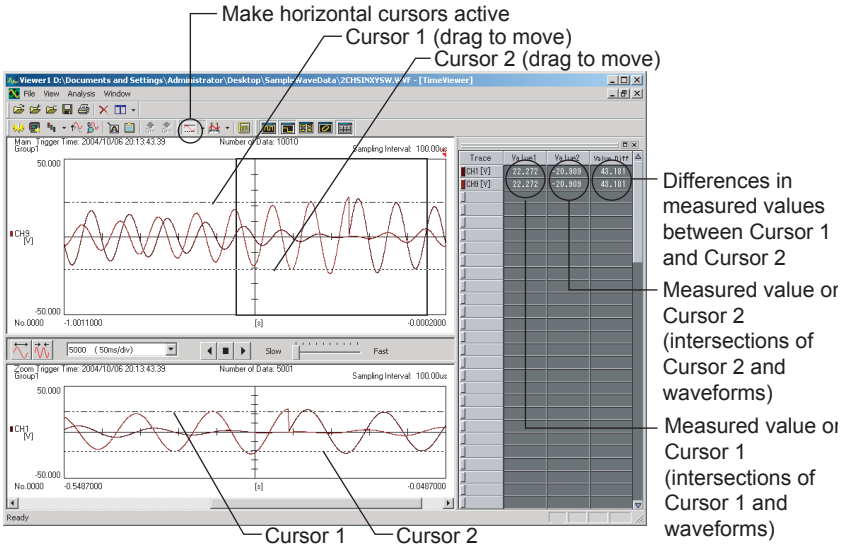
Analyzing Waveform Data Using Cursors

Choose **Vertical Cursor** from the icon drop-down menu or choose **Analysis > Analysis Mode > Vertical Cursor** to display two vertical cursors in the main waveform display window and the zoomed waveform display window.
The measurement result window displays the cursor positions (time) and measured values as well as the difference in the time and measured values between the cursors.
Each cursor can be moved by dragging. You can also click on the window to move Cursor 1 to that position. Likewise, you can right-click on the window to move Cursor 2 to that position.


Make vertical cursors active
Cursor 1 (drag to move)
Cursor 2 (drag to move)
Indicates the positior of the cursor
Differences in time between Cursor 1 and Cursor 2
Differences in measured values between Cursor 1 and Cursor 2
Measured value on Cursor 2 (intersections of Cursor 2 and waveforms)
Measured value on Cursor 1 (intersections of Cursor 1 and waveforms)
Cursor 1
Cursor 2

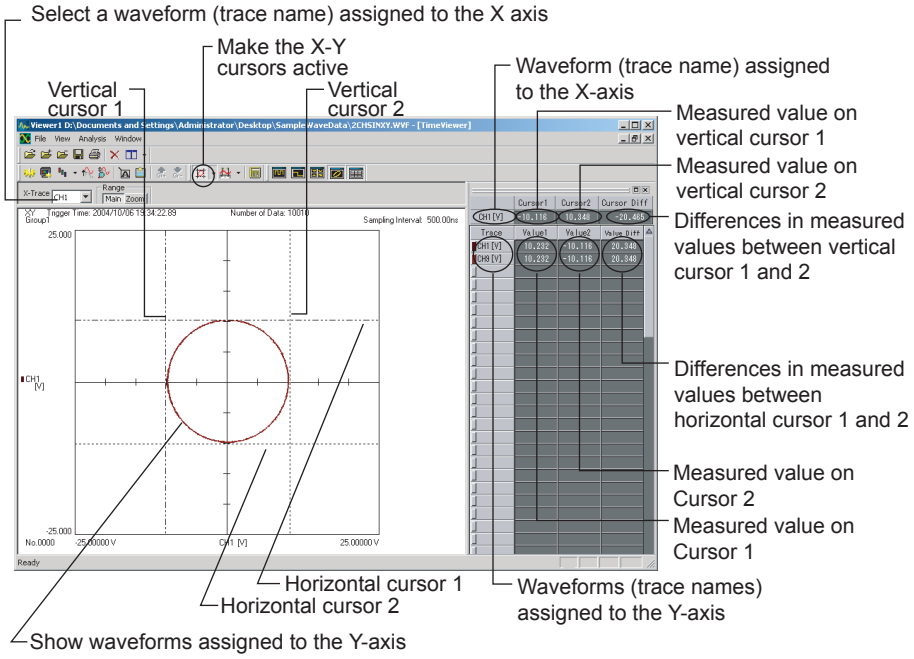
Analyzing Waveform Data Using Horizontal Cursors

Choose **Horizontal Cursor** from the icon drop-down menu or choose **Analysis > Analysis Mode > Horizontal Cursor** to display two horizontal cursors in the main waveform display window and the zoomed waveform display window.
The measurement result window displays the measured value at each cursor.
Each cursor can be moved by dragging. You can also click on the window to move Cursor 1 to that position. Likewise, you can right-click on the window to move Cursor 2 to that position.


Make horizontal cursors active
Cursor 1 (drag to move)
Cursor 2 (drag to move)
Differences in measured values between Cursor 1 and Cursor 2
Measured value or Cursor 2 (intersections of Cursor 2 and waveforms)
Measured value o Cursor 1 (intersections of Cursor 1 and waveforms)
Cursor 1
Cursor 2

Analyzing Waveform Data Using X-Y Cursors

Choose **X-Y Cursor** from the icon drop-down menu or choose **Analysis > Analysis Mode > X-Y Cursor** to display two vertical cursors and two horizontal cursors in the X-Y waveform display window. You can move a cursor by dragging it. The measurement result display window displays the measured values at the cursor positions at that time, as well as the differences in the measured values.


Select a waveform (trace name) assigned to the X axis
Make the X-Y cursors active
Vertical cursor 1
Vertical cursor 2
Waveform (trace name) assigned to the X-axis
Measured value on vertical cursor 1
Measured value on vertical cursor 2
Differences in measured values between vertical cursor 1 and 2
Differences in measured values between horizontal cursor 1 and 2
Measured value on Cursor 2
Measured value on Cursor 1
Horizontal cursor 1
Horizontal cursor 2
Waveforms (trace names) assigned to the Y-axis
Show waveforms assigned to the Y-axis

Analyzing Waveform Data Using H&V Cursors

Choose **H&V Cursor** from the icon drop-down menu or choose **Analysis > Analysis Mode > H&V Cursor** to display four cursors (two vertical cursors and two horizontal cursors) in the main waveform display window and the zoomed waveform display window. The measurement result window displays the measured value at each cursor and the differences between the measured values between the cursors.

Explanation

Cursor Measurements on History Waveform Views

When you are displaying history waveform views, only the active waveform view can be used for measurement using the cursors.

Linking of Vertical Cursors or Horizontal Cursors

If you drag a vertical cursor or horizontal cursor while holding down the Ctrl key, the two vertical or horizontal cursors can be moved simultaneously.

*** Indication

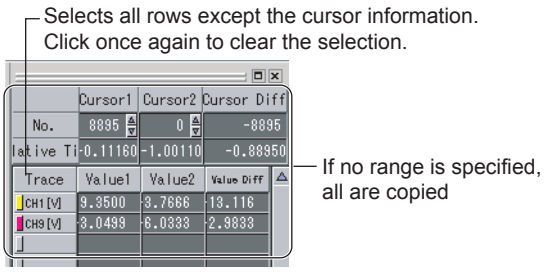
If the measurement result is invalid, "***" is displayed as the measured value.

Note

Copying Measurement Results to the Clipboard

You can copy the contents of the measurement results display window to the clipboard. Specify the range to be copied, press Ctrl + C, then the measured results are copied to the clipboard. The following methods can be used to specify a range.

- Press Ctrl + C without specifying a range to copy:
  All contents in the measurement results display window are selected
- Click Trace:
  All rows are selected except for the data at the cursor.
- Click or drag the trace names of the items to copy:
  The rows of the clicked or dragged traces are selected



4.3 Automated Measurement of Waveform

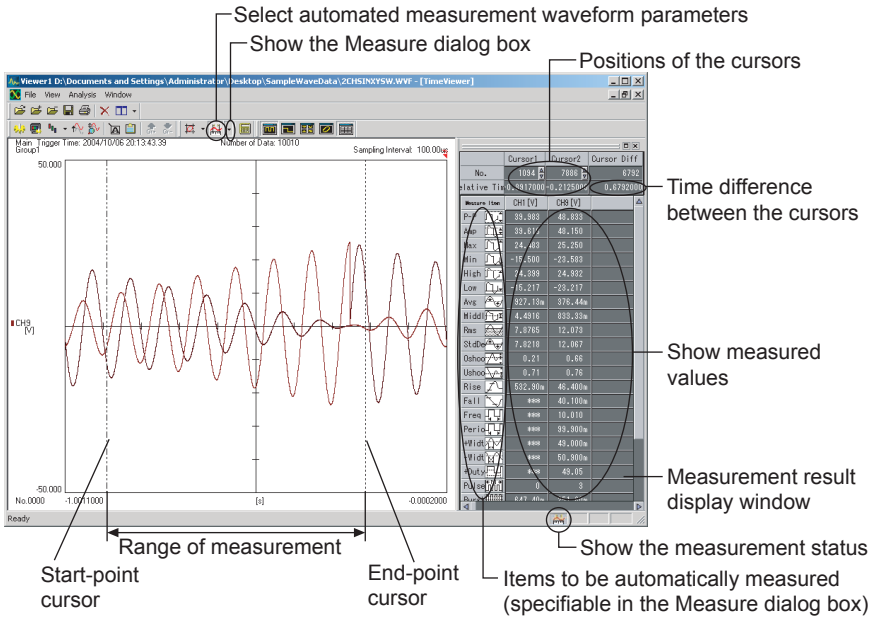
Procedure

Automated Measurement of Waveform Parameters

Click the or select **Analysis > Analysis Mode > Measure Waveform Parameter** to allocate two vertical cursors in the main waveform display window and display the results for the waveforms, after they are automatically analyzed, in the measurement result display window. By setting waveform parameters for the items to be measured, you can automatically measure the waveform parameters in the range specified by the cursors.

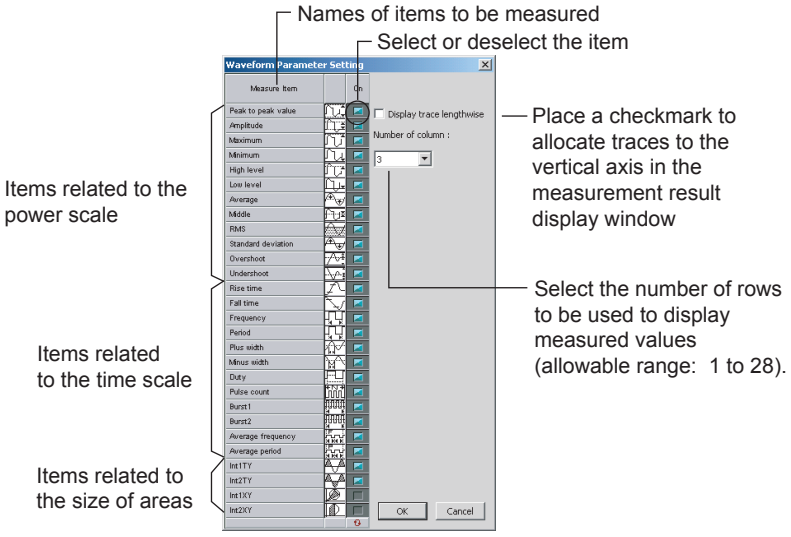
Changing the Range of Automated Measurement

You can change the range of automatic measurement by dragging the two vertical cursors to the new measurement start and end points.


Select automated measurement waveform parameters
Show the Measure dialog box
Positions of the cursors
Time difference between the cursors
Show measured values
Measurement result display window
Show the measurement status
Range of measurement
Start-point cursor
End-point cursor
Items to be automatically measured (specifiable in the Measure dialog box)

Setting Items That Are Automatically Measured

Click ▼ beside the , or select **Analysis > Measure Waveform Parameter** to display the Measure dialog box. In the dialog box, you can specify the display settings for the items to be measured and the measured values.



Explanation

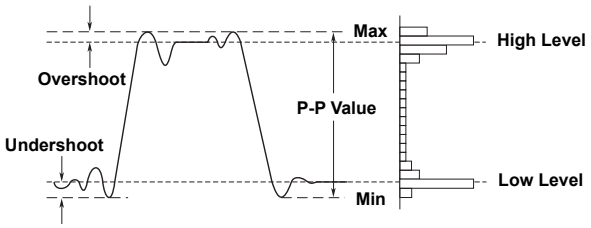
Items that Can Be Specified

You can set and measure items related to the power scale and time scale as waveform parameters.

- Items related to the power scale

Maximum : Maximum voltage [V]
Minimum : Minimum voltage [V]
High level : High voltage [V]
Low level : Low voltage [V]
Peak to peak value : P-P value (Max - Min) [V]
Amplitude : Amplitude (High - Low) [V]

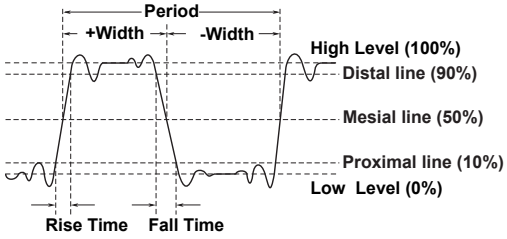
Average : Average voltage (1/n)Σxi [V]
RMS : Root-mean-square value $(1/\sqrt{n})(\Sigma(xi)^2)^{1/2}$ [V]
Middle : Mean value for amplitude (Max + Min)/2 [V]
Standard deviation : Standard deviation $(1/n(\Sigma x^2 - (\Sigma x^2)/n)^{1/2}$
Overshoot : Amount of overshoot (Max - High)/(High - Low)_100 [%]
Undershoot : Amount of undershoot (Low - Min)/(High - Low)_100 [%]



- Items related to the time scale

Rise time : Rise time [s]
Fall time : Fall time [s]
Frequency : Frequency [Hz]
Period : Cycle [s]

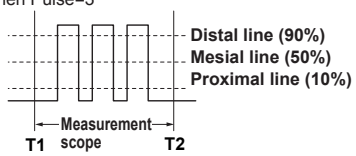
Plus duty : Duty ratio, Width1/Period_100 [%]
Minus duty : Duty ratio, Width2/Period_100 [%]
Plus width : Time width greater than the mesial value [s]
Minus width : Time width less than the mesial value [s]



Pulse : Pulse count

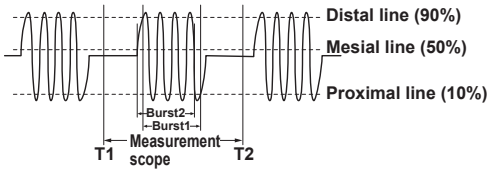
Adjust the measurement scope to the pulses you want to measure.

When Pulse=3



Burst1, Burst2 : Burst width [s]

Adjust the measurement scope to the burst widths you want to measure.

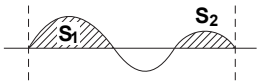


- Items related to the size of areas
  Int1TY: Size of the positive portion of an amplitude
  Int2TY: Size of the positive portion of an amplitude - Size of the negative portion of an amplitude
  Int1XY:
  - Total area in which the start and stop points trace multiple identical closed curves
  - Area enclosed by a curve connecting the start and stop points
  - Area in which the start and stop points trace the shape of an “8”
  - Area in which the start and stop points trace a closed curve in a spiral loop

  Int2XY:
  - When 1 Y data point corresponds to 1 X data point
  - When the amplitude contains negative sections
  - When multiple Y data points correspond to 1 X data point

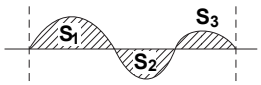
Int1TY

Size of only the positive areas : S_1+S_2



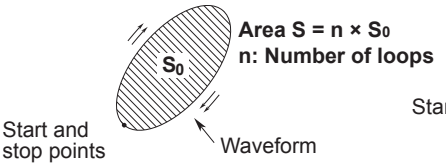
Int2TY

Size of both positive and negative areas : $S_1+S_3-S_2$

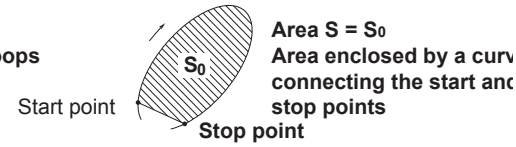


Int1XY

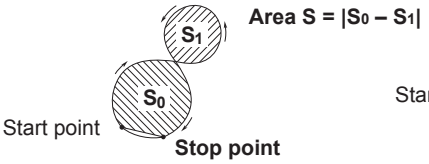
(1) Multiple loops



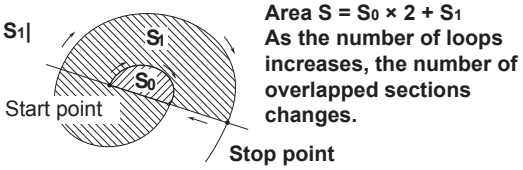
(2) Non-closed curve



(3) Loop tracing the shape of an “8”



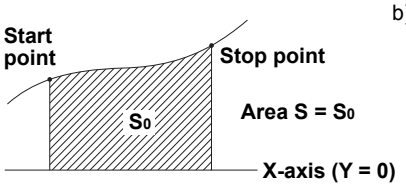
(4) Spiral loop



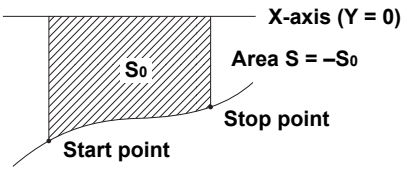
Int2XY

(1) When 1 Y data point corresponds to 1 X data point

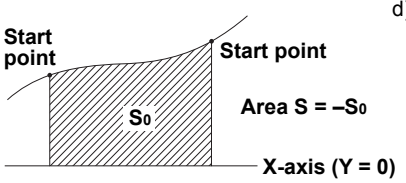
a)



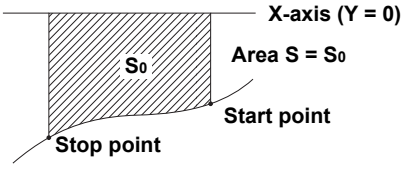
b)



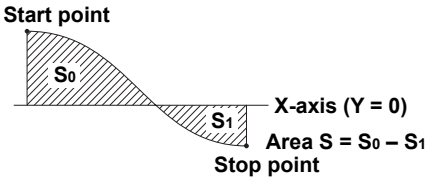
c)



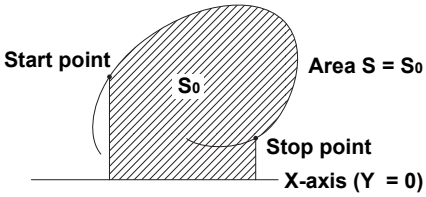
d)

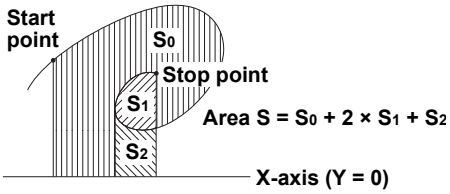


(2) When the waveform contains negative amplitude



(3) When multiple Y data points correspond to 1 X dat a point





*** Indication

If the measurement result is invalid or impossible, "***" is displayed as the measured value. Waveforms with small amplitudes may fail to produce correct readings.

Data Obtained through Automatic Measurements with Waveform Parameters

To keep the obtained data, save it into a file. For details, see Section 5.4.

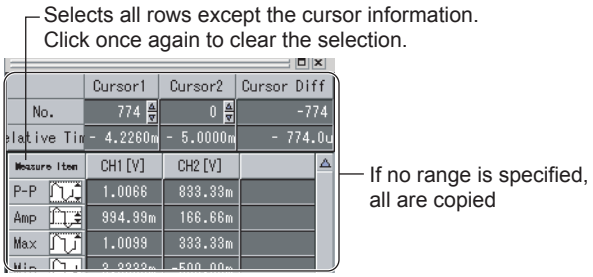
Icon Displayed during Automatic Measurement

While automatic measurement is being performed, the icon shown below appears in the status bar.

: Performing automatic measurement (blinks on and off)

Note

- When the scope to analyze includes two cycles or more of a waveform, time-axis parameters are analyzed only for the fist cycle.
- No logic waveform can be automatically analyzed.
- It may take a long time to automatically analyze a waveform with some conditions for the scope, number of items, and/or waveforms to analyze.
- An FFT computation allows to make measurement only for Max and Min.
- **Copying Measurement Results to the Clipboard**
  You can copy the contents of the measurement results display window to the clipboard. Specify the range to be copied, press Ctrl + C, then the measured results are copied to the clipboard. The following methods can be used to specify a range.
  - Press Ctrl + C without specifying a range to copy:
    All contents in the measurement results display window are selected
  - Click Measure Item:
    All rows are selected except for the data at the cursor.
  - Click or drag the measurement items of the items to copy:
    The rows of the clicked or dragged items are selected

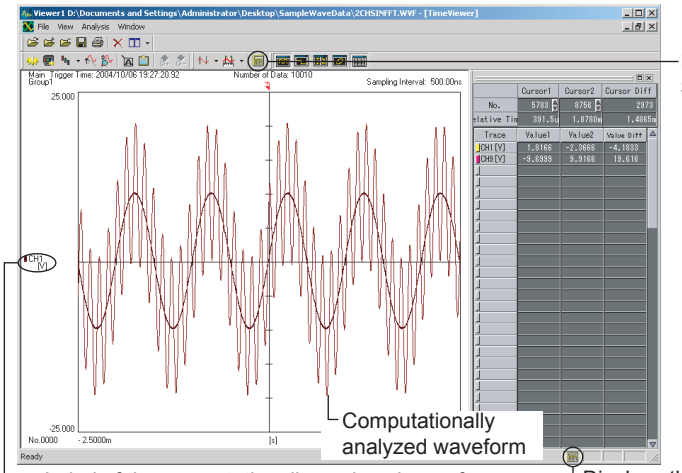


4.4 Analyzing Waveforms by Computations (Math Edition)

Procedure

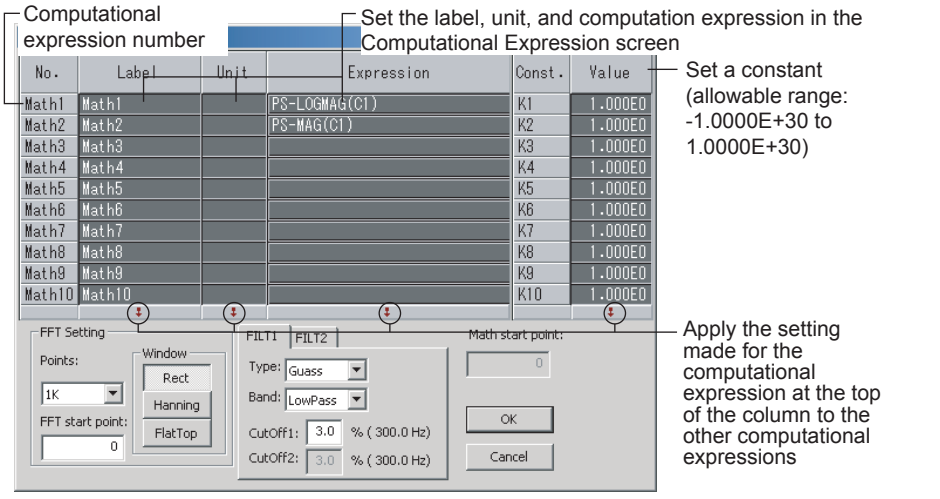
Displaying Waveforms in the Computation View

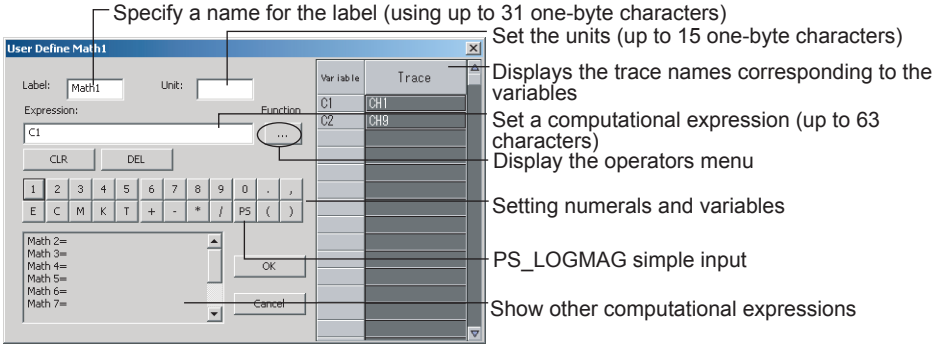
Click the or select **Analysis > Math Setting** to display the Math Setting dialog box for analyzing waveforms by computational expressions. The Math Setting dialog box allows you to set computational expressions, filters, FFT computations, and other computations for waveforms.


Displays the Math Setting dialog box
Computationally analyzed waveform
Label of the computationally analyzed waveform
Displays the computation status

Setting Computational Expressions

Click the **Expression** in the Math Setting dialog box to display the Computational Expression screen, which allows you to specify user-defined computation settings. Set up a required computational expression by using variables and operators.



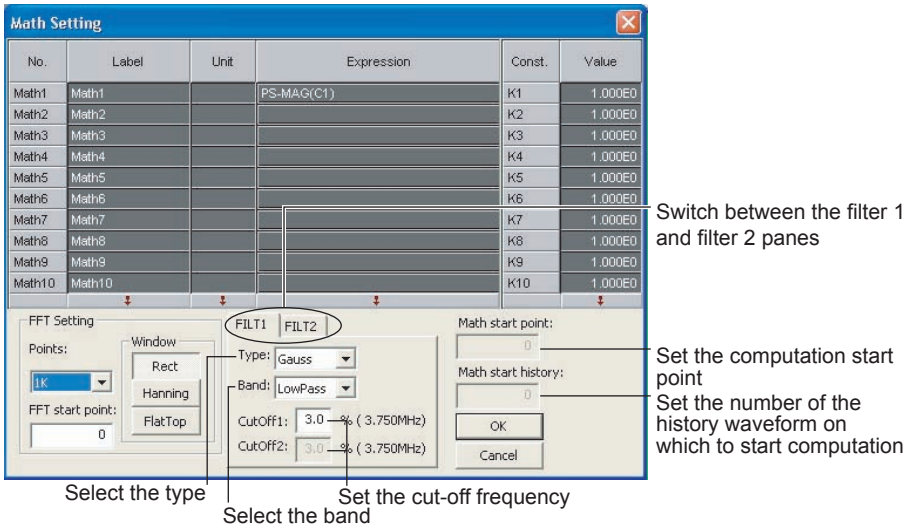


Setting Filters

Use the FILT1 and FILT2 tabs on the Math Setting dialog box to set up the filters.

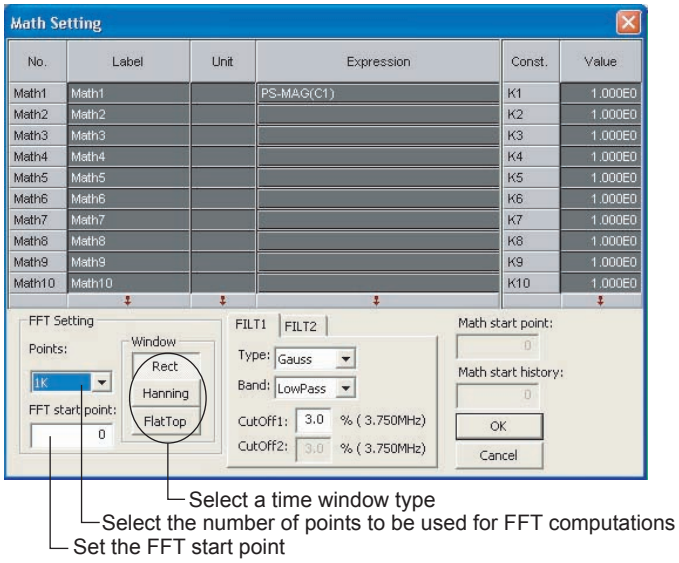
Setting the Computation Start Point and Start History

- If the record length (no. of data) exceeds 12.5 Mpoints 2.5 Mpoints if there are 11 or more MATH channels, you can set the computation start point.
- With history waveforms, if (no. of history waveforms × record length per waveform) exceeds 12.5 Mpoints 2.5 Mpoints if there are 11 or more MATH channels, you can set the number of the history waveform on which to start computation (computation start history) and the computation start point. With this computation setting, waveforms are assigned in order from 0 to positive integers starting with the oldest waveform.



Specifying FFT Settings

Use FFT Setting on the Math Setting dialog box to specify the FFT settings.



Explanation

Function Menu Button

The Function menu button of the Computational Expression dialog box contains operators that can be specified for user-defined computational expressions, as follows:

Basic	SHIFT, ABS, SQRT, LOG, EXP, NEG, P2, P3, F1, F2	
Trigonometric	SIN, COS, TAN, ATAN, PH	
Pulse Width	PWHH, PWHL, PWLH, PWLL, PWXX, FV, DUTYH, DUTYL	
DIF & INTG	DIF, DDIF, INTG, IINTG	
Filter	FILT1, FILT2, HLBT, MEAN, BIN	
FFT	LS	LS-REAL, LS-IMAG, LS-MAG, LS-LOGMAG, LS-PHASE
	RS	RS-MAG, RS-LOGMAG
	PS	PS-MAG, PS-LOGMAG, PSD-MAG, PSD-LOGMAG
	CS	CS-REAL, CS-IMAG, CS-MAG, CS-LOGMAG, CS-PHASE
	TF	TF-REAL, TF-IMAG, TF-MAG, TF-LOGMAG, TF-PHASE
	CH	CH-MAG

Restrictions Imposed on Computational Expressions

- When m ≤ n, a computational expression for Mathn cannot include the variable Mn (Operations for Mathn).
  Example of an expression that is not allowed: Math5 = M6 + M3
- One FFT computation allows the specification of one waveform.
  Example of an expression that is not allowed: PS-MAG(C1+C2)
- A computation cannot be performed on the result of an FFT computation.
  Example of an expression that is not allowed: PS-MAG(C1)+C2
  Cautions on Computations
  - An FFT computation that does not have a record length that is sufficient for the required number of points for computation in the target view cannot be performed.

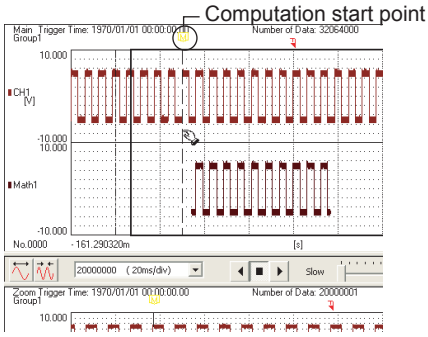
Settings for the Filters

- **Type/Band**
  Gauss (gauss) : Lowpass
  Sharp (sharp) : Lowpass/Highpass/Bandpass
  IIR (butterworth): Lowpass/Highpass/Bandpass
- **CutOff1/CutOff2**
  Set either or both cutoff frequencies as a ratio to the sampling frequency. The allowable range is 2.0% to 30.0% (0.2% steps). When you specify Bandpass for Band, specify the orders of both CutOff1 and CutOff2. The higher the order, the longer the computation.

Computation Start Point

If the record length (the number of data points) is greater than to 12.5 Mpoints 2.5 Mpoints if there are 11 or more MATH channels, you can specify the computation start point and perform the computation.

If the record length is greater than to 12.5 Mpoints 2.5 Mpoints if there are 11 or more MATH channels, a yellow mark indicating the computation start point appears on the screen as shown below. If you drag the yellow mark, a cursor appears allowing you to move the computation start point. xz



Number of Points for Computation

• There are 12.5 Mpoints 2.5 Mpoints if there are 11 or more MATH channels for computation/channel.

• Computation with more than 2 Gpoints is not possible.

Variables and Operators

The variables and operators that can be used in computational expressions are listed below. You can use up to 63 characters to define a computational expression. You can register up to 32 computational expressions.

Variables

Variable	Sample Use	Description
Cx	C1+C2	**Value measured on channel CHx**
My	ABS(M1)	**Value of computation (Math)**
T	SIN(T)	**Integrated value for the number of data points to the time axis**

x: stands for a number, However, specify the number according to the number of channels that are loaded. For example, if three channels, CH1, CH5, and CH8, are loaded, specify the channels as C1, C2, and C3.

y: stands for a number

Operator

Operator	Sample Use	Description
+,-,*,/	C1+C2	Four arithmetical Operations on two specified waveforms
SHIFT	SHIFT(C1,1000)	Phase shift
ABS	ABS(M1)	Absolute value of a specified waveform
SQRT	SQRT(C2)	Square root of a specified waveform
LOG	LOG(C1)	Logarithm of a specified waveform
EXP	EXP(C1)	Exponent of a specified waveform
NEG	NEG(C1)	Inversion
SIN	SIN(T)	Sine of a specified waveform
COS	COS(C1)	Cosine of a specified waveform
TAN	TAN(C1)	Tangent of a specified waveform
ATAN	ATAN(C1,C2)	Arctangent of two specified waveforms (value within $\pm \pi$)
P2	P2(C1)	Square of a specified waveform
P3	P3(C1)	Cube of a specified waveform
F1	F1(C1,C2)	$\sqrt{(\lvert C1^2+C2^2 \rvert)}$ of a specified waveform
F2	F2(C1,C2)	$\sqrt{(\lvert C1^2+C2^2 \rvert)}$ of a specified waveform
K1toK10	C1 + K1	Constant (any value specified)
BIN	BIN(C1,A,B)	Binarization of a specified waveform
PWHH	PWHH(M1,A,B)	Computation of a pulse width between a rising edge and the next rising edge
PWHL	PWHL(C2,A,B)	Computation of a pulse width between a rising edge and the next falling edge
PWLH	PWLH(C1,A,B)	Computation of a pulse width between a falling edge and the next rising edge
PWLL	PWLL(C1,A,B)	Computation of a pulse width between a falling edge and the next falling edge
PWXX	PWXX(C2,A,B)	Computation of a pulse width between a raising/falling edge and the next rising/falling edge
FV	FV(C1,A,B)	PWHH reciprocal
DUTYH	DUTYH(C1,A,B)	Duty cycle between a rising edge and the next rising edge
DUTYL	DUTYL(C1,A,B)	Duty cycle between a falling edge and the next falling edge
MEAN	MEAN(C1)	10th moving average of a specified waveform
DIF	DIF(C1)	Differentiation of a specified waveform
DDIF	DDIF(C1)	Second-order derivative of a specified waveform
INTG	INTG(C1)	Integration of a specified waveform
IINTG	IINTG(C1)	Second-order integration of a specified waveform
PH	PH(C1,C2)	Phases of two specified waveforms
HLBT	HLBT(C1)	Hilbert function of a specified waveform
FILT1	FILT1(C1)	Filter for a specified waveform
FILT2	FILT2(C1)	Filter for a specified waveform
LS-REAL	LS-REAL(C1)	Real part of the linear spectrum of a specified waveform
LS-IMAG	LS-IMAG(C1)	Imaginary part of the linear spectrum of a specified waveform
LS-MAG	LS-MAG(C1)	Amplitude of the linear spectrum of a specified waveform
LS-LOGMAG	LS-LOGMAG(C1)	Logarithmic amplitude of the linear spectrum of a specified waveform
LS-PHASE	LS-PHASE(C1)	Phase of the linear spectrum of a specified waveform
RS-RS-MAG	RS-MAG(C1)	Amplitude of the effective spectrum of a specified waveform
RS-LOGMAG	RS-LOGMAG(C1)	Logarithmic amplitude of the effective spectrum of a specified waveform
PS-MAG	PS-MAG(C1)	Amplitude of the power spectrum of a specified waveform
PS-LOGMAG	PS-LOGMAG(C1)	Logarithmic amplitude of the power spectrum of a specified waveform
PSD-MAG	PSD-MAG(C1)	Amplitude of the power spectrum density of a specified waveform
PSD-LOGMAG	PSD-LOGMAG(C1)	Logarithmic amplitude of the power spectrum density of a specified waveform
CS-REAL	CS-REAL(C1,C2)	Real part of the cross spectrum of two specified waveforms
CS-IMAG	CS-IMAG(C1,C2)	Imaginary part of the cross spectrum of two specified waveforms
CS-MAG	CS-MAG(C1,C2)	Amplitude of the cross spectrum of two specified waveforms
CS-LOGMAG	CS-LOGMAG(C1,C2)	Logarithmic amplitude of the cross spectrum of two specified waveforms
CS-PHASE	CS-PHASE(C1,C2)	Phase of the cross spectrum of two specified waveforms
TF-REAL	TF-REAL(C1,C2)	Real part of the transfer function of two specified waveforms
TF-IMAG	TF-IMAG(C1,C2)	Imaginary part of the transfer function of two specified waveforms
TF-MAG	TF-MAG(C1,C2)	Amplitude of the transfer function of two specified waveforms
TF-LOGMAG	TF-LOGMAG(C1,C2)	Logarithmic amplitude of the transfer function of two specified waveforms
TF-PHASE	TF-PHASE(C1,C2)	Phase of the transfer function of two specified waveforms
CH-MAG	CH-MAG(C1,C2)	Amplitude of the coherence function of two specified waveforms

Settings for FFT

- **Points** (number of points used for computation):
  Select 100 points, 200 points, 500 points, 1000 points, 2000 points, 5000 points, 10000 points, 20000 points, 50000 points, 100000 points, 200000 points, 500000 points, 1000000 points, or 2000000 points.

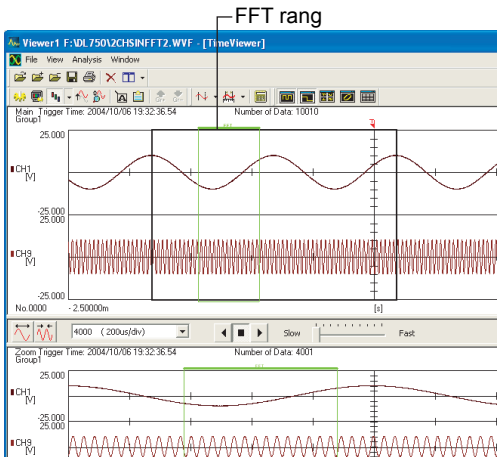
Note

Executing an FFT calculation with 1000000 points or more, only M1 is calculated and the result is displayed.

- **FFT start point:**
  When the number of loaded points is less than 10M: Specify 0 to “Number of loaded points-no. of FFT computation points”
  When larger than 10M: set between computation start point and “computation start point + 10M - no. of FFT points”
- **Window** (time window):
  Select the Rect (rectangle), Hanning (hanning), or FlatTop (flat-top) window.

Displaying the FFT Range

The FFT range is indicated with a green bar on the main waveform display window and the zoomed waveform display window.
Drag the bar to move the computation range.
If FFT cannot be performed, the bar indicating the range and the word “FFT” turn red.



Icon displayed during measurement through computation

While measurement through computation is being performed, the icon shown below appears in the status bar.

: Computing (blinks on and off)

: Accessing file

Computational accuracy

Single-precision floating-point type

Details of Various Computations

Filter (FILT1/FILT2)

Type

Type	Bandwidth
Gauss	Lowpass
Sharp	Lowpass/Highpass/Bandpass
IIR (Butterworth)	Lowpass/Highpass/Bandpass

Filter Orders

See the following table for the filter orders.

Cutoff frequency/sampling frequency × 100		2%	5%	10%	20%	30%
Gauss	Lowpass	49	21	9	5	5
Sharp	Lowpass	88	36	18	9	8
	Highpass	159	65	33	17	13
IIR	Lowpass	4	4	4	3	2
Highpass	Highpass	4	4	4	4	3

Note

- You can set the cutoff frequency in the range from 2 to 30% of the sampling frequency (in 0.2% steps).
- The higher the filter order, the longer computation takes.

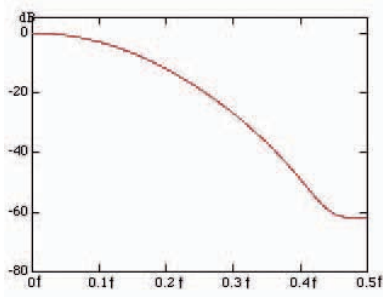
Filter Characteristics

Filter	Pass band Ripple	Attenuation slope	Attenuation in the Stop band	Phase
Gauss	0 dB	*	-	Linear
Sharp	± 0.3 dB	–40 dB at 1 oct (Lowpass), –40 dB at –1 oct (Highpass)	–40 dB	Linear
IIR	0 dB	–5 dB at 1/6 oct (Lowpass), –20 dB at –1 oct (Highpass)	-	Non-linear

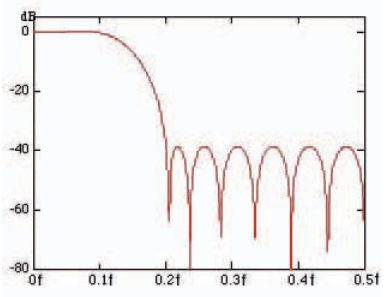
* Attenuation for a Gauss filter is –3.0×(f/fc)2 dB (where f is the frequency and fc is the cutoff frequency).

Examples of Frequency Characteristics for Various Filters

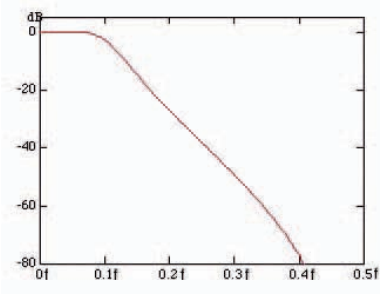
Gauss (cutoff 10%)



Sharp (Lowpass, cutoff 10%)



IIR (Lowpass, cutoff 10%)



f : Sampling Frequency

Hilbert Function (HLBT)

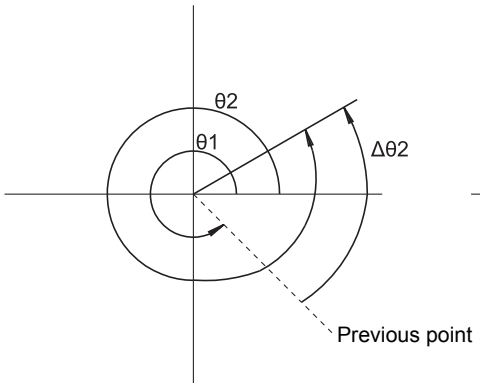
Normally, when we analyze a real time signal, it is convenient to think of the signal as the real part of a complex valued signal. Analysis is often more convenient when done using the complex signal. Given that the real time signal is considered to be the real part of the complex signal, the imaginary part is then equal to the Hilbert transform of the real part. When performing a Hilbert transform on a signal in the time domain, the signal is first transformed into the frequency domain using the Fourier transform. Next, the phase of each frequency component is shifted by –90 degrees if the frequency is positive and +90 degrees if negative. Lastly, the Hilbert transform is completed by taking the inverse Fourier transform. As can be seen from the above description, the Hilbert transform does not change the order of the individual variables. The Hilbert transform of a time signal results in another time signal.

Application Example

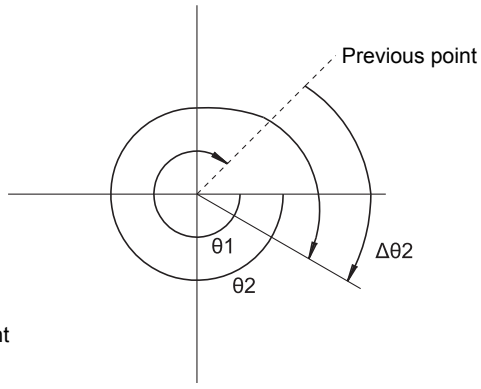
The Hilbert transform can be used to analyze an envelope waveform.
AM (amplitude modulation): SQRT(C1*C1+HLBT(C1)*HLBT(C1))
Demodulation of a FM signal: DIF(PH(C1, HLBT(C1)))

Phase Function (PH)

Phase function PH(C1, C2) computes tan-1 (C1/C2). However, the phase function takes the phase of the previous point into consideration and continues to sum even when the value exceeds ±π (The ATAN function reflects at ±π). The unit is radians.



θ2=θ1+Δθ2

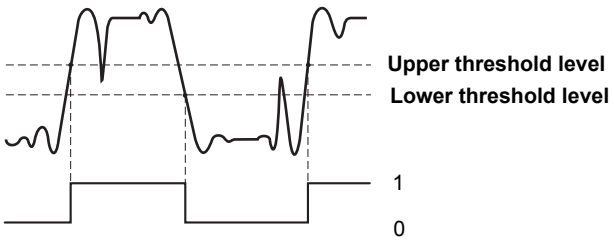


θ2=θ1–Δθ2

Binary Conversion (BIN)

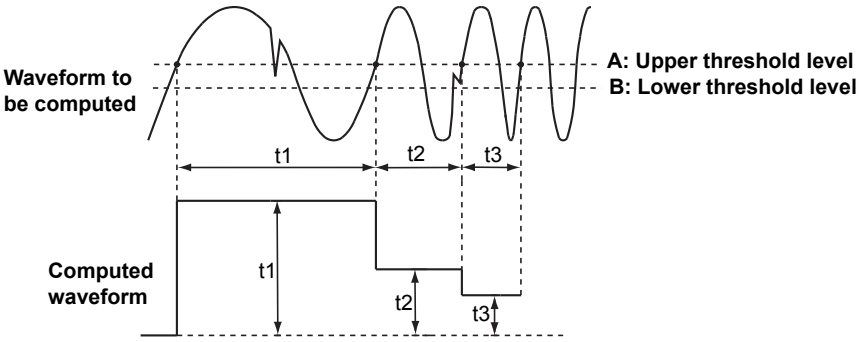
Performs binary conversion with respect to the specified threshold level.

The threshold level is specified as follows:
A and B represent the Upper and Lower threshold levels, respectively.
BIN(C1, A, B)



Pulse Width Computation (PWHH/PWHL/PWLH/PWLL/PWXX)

The signal is converted into binary values by comparing to a preset threshold level, and the time of the pulse width is plotted as the Y-axis value for that interval.
The following 4 intervals are available:
PWHH: From the rising edge to the next rising edge.
PWHL: From the rising edge to the next falling edge.
PWLH: From the falling edge to the next rising edge.
PWLL: From the falling edge to the next falling edge.
PWXX: From the rising or falling edge to the next rising or falling edge.
The threshold level is specified as follows:
A and B represent the Upper and Lower threshold levels, respectively.
PWHH (C1, A, B)



FFT

Linear Spectrum (LS-REAL/LS-IMAG/LS-MAG/LS-LOGMAG/LS-PHASE)

The linear spectrum is directly determined by the FFT. The power spectrum and cross spectrum can be determined from one or two linear spectra.

The FFT is a complex function, and thus the linear spectrum is composed of both a real and an imaginary part. The magnitude and phase of the frequency components of the measured waveform can be derived from the real and imaginary parts of the FFT result. The following spectra can be determined:

Item	Expression	Computation
Real part	LS-REAL	R
Imaginary part	LS-IMAG	I
Magnitude	LS-MAG	$\sqrt{(R^2+I^2)}$
Log magnitude	LS-LOGMAG	$20 \times \log \sqrt{(R^2+I^2)}$
Phase	LS-PHASE	$\tan^{-1}(I/R)$

Log magnitude reference (0 dB): 1 Vpeak

R, I: R and I represent the real part and the imaginary part, respectively, when each frequency component G of a linear spectrum is represented by “R+jI.”

Rms Value Spectrum (RS-RS-MAG/RS-LOGMAG)

Rms value spectrum expresses the rms value of the magnitude of the linear spectrum. It does not contain phase information.

The following spectra can be determined:

Item	Expression	Computation
Magnitude	RS-MAG	$\sqrt{(R^2+I^2)/2}$
Log magnitude	RS-LOGMAG	$20 \times \log \sqrt{(R^2+I^2)/2}$

Log magnitude reference (0 dB): 1 Vrms

Power Spectrum (PS-MAG/PS-LOGMAG/PSD-MAG/PSD-LOGMAG)

The power spectrum expresses the power of each frequency component included in the measured signal. It is determined by taking the product of the linear spectrum and its complex conjugate. It does not contain phase information.

The following spectra can be determined:

Item	Expression	Computation	
Amplitude	PS-MAG	DC component	R^2+I^2
		AC component	$(R^2+I^2)/2$
Log magnitude	LS-MAG	DC component	$10 \times \log(R^2+I^2)$
		AC component	$10 \times \log\{(R^2+I^2)/2\}$

Log magnitude reference (0 dB): 1 $Vrms^2$

Power Spectral Density (PSD-MAG/PSD-LOGMAG)

The power spectral density (PSD) expresses the power spectrum per unit frequency. It is determined by dividing the power spectrum by the frequency resolution Δf found during the analysis of the power spectrum. The results of the PSD computation vary depending on the window function chosen. The power spectral density is used to compare power spectra analyzed at different frequency bands. However, it is not necessary for signals having a line spectrum such as a sine wave.

The following spectra can be determined:

Item	Expression	Computation
Magnitude	PSD-MAG	PS-MAG/Δf (for rectangular window)
		PS-MAG/1.5Δf (for Hanning window)
Log magnitude	PSD-LOGMAG	$10 \times$ logPS-MAG/Δf (for rectangular window)
		$10 \times$ logPS-MAG/1.5Δf (for Hanning window)

Log magnitude reference (0 dB): 1 $Vrms^2$

Cross Spectrum (CS-REAL/CS-IMAG/CS-MAG/CS-LOGMAG/CS-PHASE)

The cross spectrum is determined from 2 signals. It is found by taking the product of the linear spectrum of one signal(Gx) and the complex conjugate (Gx*) of the linear spectrum of the other signal (Gy).

If the linear spectra of the 2 signals are represented by

$Gx=Rx+jIx$

$Gy=Ry+jIy$

then the cross spectrum Gyx is

$Gyx=Gy\times Gx^*$

$=(Ry+jIy)(Rx-jIx)=Ryx+jIyx$

where $Ryx=RyRx+IyIx$

$Iyx=RxIy-RyIx$

The following spectra can be determined:

Item	Expression	Computation	
Real part	CS-REAL	DC component	Ryx/
		AC component	Ryx/2
Imaginary part	CS-IMAG	DC component	Iyx
		AC component	Iyx/2
Amplitude	CS-MAG	DC component	$\sqrt{(Ryx^2+Iyx^2)}$
		AC component	$\sqrt{(Ryx^2+Iyx^2)}$ /2
Log magnitude	CS-LOGMAG	DC component	$10 \times \log \sqrt{(Ryx^2+Iyx^2)}$
		AC component	$10 \times \log(\sqrt{(Ryx^2+Iyx^2)}$ /2)
Phase	CS-PHASE	$\tan^{-1}$(Iyx/Ryx)	

Transfer Function (TF-REAL/TF-IMAG/TF-MAG/TF-LOGMAG/TF-PHASE)

The transfer function expresses the frequency characteristics between the input and the output of a system. The transfer function is given by the ratio of the linear spectrum of the output(Gy) to the spectrum of the input(Gx) at each frequency. Also, as can be seen from the equation below, the transfer function can be defined as the ratio of the cross spectrum of the input and output (Gyx) and the input power spectrum (Gxx).

Transfer Function = Gy/Gx = (Gy×Gx*)/(Gx×Gx*) = Gyx/Gxx = (Ryx+jIyx)/(Rx2+Ix2)

The following items can be determined:

Item	Expression	Computation
Real part	TF-REAL	$Ryx/(Rx^2+Ix^2)$
Imaginary part	TF-IMAG	$Iyx/(Rx^2+Ix^2)$
Magnitude	TF-MAG	$\sqrt{(Ryx^2+Iyx^2)}$ $/(Rx^2+Ix^2)$
Log magnitude	TF-LOGMAG	$20 \times \log \sqrt{(Ryx^2+Iyx^2)}$ $/(Rx^2+Ix^2)$
Phase	TF-PHASE	tan–1(Iyx/Ryx)

The magnitude of the transfer function gives the ratio of the magnitudes of the linear spectra of the output and input, whereas phase of the transfer function gives the phase difference between the two.

Coherence Function (CH-MAG)

This function expresses the ratio of the output power generated by the input to the system to the total output power.
Coherence function = Gyx×Gyx*/(Gxx×Gyy)

Item	Expression	Computation
Magnitude	CH-MAG	(Ryx2+Iyx2)/(Gxx × Gyy)

If the output signal is due entirely to the input signal, the coherence function becomes 1. As the ratio decreases, it falls below 1. Thus, the coherence function always takes on a value between 0 and 1.

Note

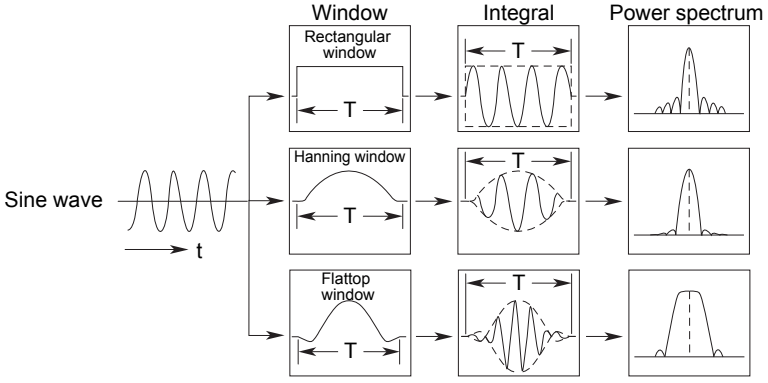
- On one data acquisition, the coherence function becomes 1 across all frequencies.
- The computed waveform must be averaged.

Number of FFT Computed Points

You can select 100 points, 200 points, 500 points, 1000 points, 2000 points, 5000 points,10000 points, 20000 points, 50000 points, 100000 points, 200000 points, 500000 points,1000000 points, or 2000000 points.

About Time Windows

You can select rectangular, Hanning, or flattop as the time window.
The rectangular window is best suited to transient signals, such as an impulse wave, that attenuate completely within the time window. The Hanning window allows continuity of the signal by gradually attenuating the parts of the signal located near the ends of the time window down to the “0” level. Hence, it is best suited to continuous signals. The frequency resolution of the Hanning window is higher compared with the Flattop window. However, the flattop window has a higher level of accuracy of the spectrum. When the waveform being analyzed is a continuous signal, consider the above characteristics when selecting the proper window to use.



Rectangular window : $W(t)=u(t)-u(t-T)$ U(t) : Step function

Hanning window : $W(t)=0.5-0.5\cos(2\pi \frac{t}{T})$

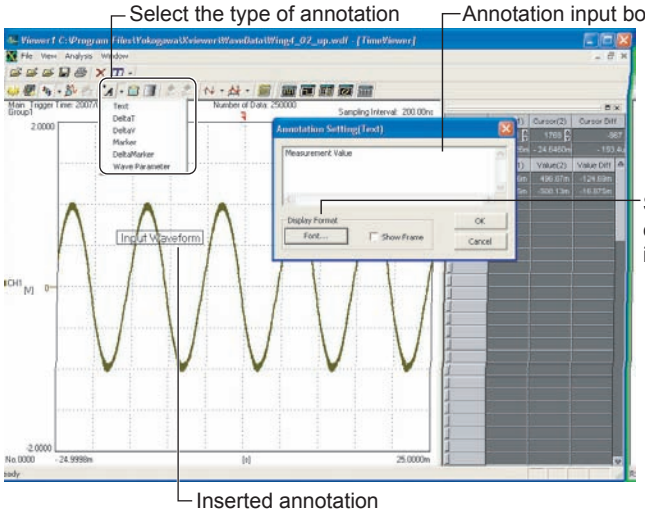
Flattop window : $W(t)=\{0.54-0.46\cos(2\pi \frac{t}{T})\} \frac{\sin\{2\pi(1-2t/T)\}}{2\pi(1-2t/T)}$

4.5 Inserting Annotations in the Waveform View

Procedure

Inserting Annotations

1. Click ▼ of , ▼ or click View > Add Annotation and select Annotation Type. There are six types of annotations: text, DeltaT, DeltaV, marker, Delta marker, and waveform parameter. The pointer icon displayed in the tool bar or waveform view changes according to the selected annotation. For details, see the explanation starting on the next page.
2. Insert the annotation using the appropriate procedure for the selected annotation. For details, see the explanation starting on the next page. When selecting an annotation of a particular type while in Annotation mode, if you click a different type of annotation that was previously inserted, the selected annotation changes to the clicked type. Select the type of annotation


Select the type of annotation
Annotation input box
Set the annotation font and color in the dialog box that is displayed.
Inserted annotation

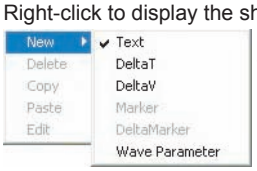
Inserting Annotations Using the (Right-Click) Shortcut Menu

When in Annotation mode, a shortcut menu is displayed when procedure a or b below is carried out. You can select an annotation type from the New submenu and insert the various types of annotations on screen.

a. Right-click in the waveform view.
b. Right-click on the waveform.

- **Procedure 'a' Shortcut Menu**

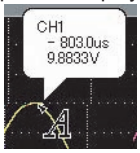
  Right-click to display the shortcut menu.



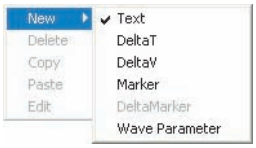
Select a type of annotation: text, DeltaT, DeltaV, or waveform parameter. Marker and Delta marker cannot be selected.

- **Procedure 'b' Shortcut Menu**

  If you place the pointer on the waveform, the information for that point is displayed.



Right-click to display the shortcut menu.



Select a type of annotation: text, Delta , Delta V , marker, c waveform parameter. Delta marker cannot be selected.

Copying and Pasting Annotations

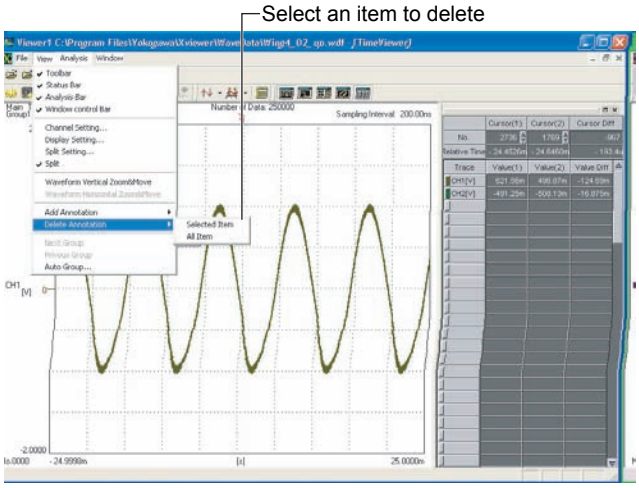
Click to select the annotation to copy, then right-click to display the same shortcut menu mentioned on the previous page. Select **Copy**. Right-click the location onto which you wish to paste the annotation, then select **Paste** in the shortcut menu that is displayed.

Editing Annotations

Click to select the annotation to edit, then right-click to display the same shortcut menu mentioned on the previous page. Select **Edit**. A dialog box corresponding to the selected annotation is displayed. Edit the annotation, then click **OK** or **Apply**.

Deleting Annotations

To delete annotations, click **View** > **Delete Annotation** > **Selected Item** or **All Items**. You can also click to select an annotation you wish to delete and press the **Delete** key. Or, you can click to select the annotation to delete, right-click to display the same shortcut menu mentioned on the previous page, and then select **Delete**.



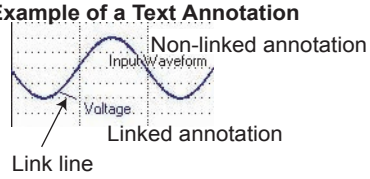
Explanation

Annotation Types

There are six types of annotations: text, DeltaT, DeltaV, marker, Delta marker, and waveform parameter.

- **Linked Annotations**
  - DeltaT, DeltaV, marker, Delta marker, and waveform parameter are all annotations that are linked to waveforms.
  - If the text annotations is linked to a waveform, they are connected by link lines.
  - You can insert annotations into individual waveforms. Links to each waveform are preserved even if you switch the displayed group.
- **Non-Linked Annotations**
  Text annotations without link lines are non-linked annotations. Their positions change relative to the size of the screen.

Example of a Text Annotation

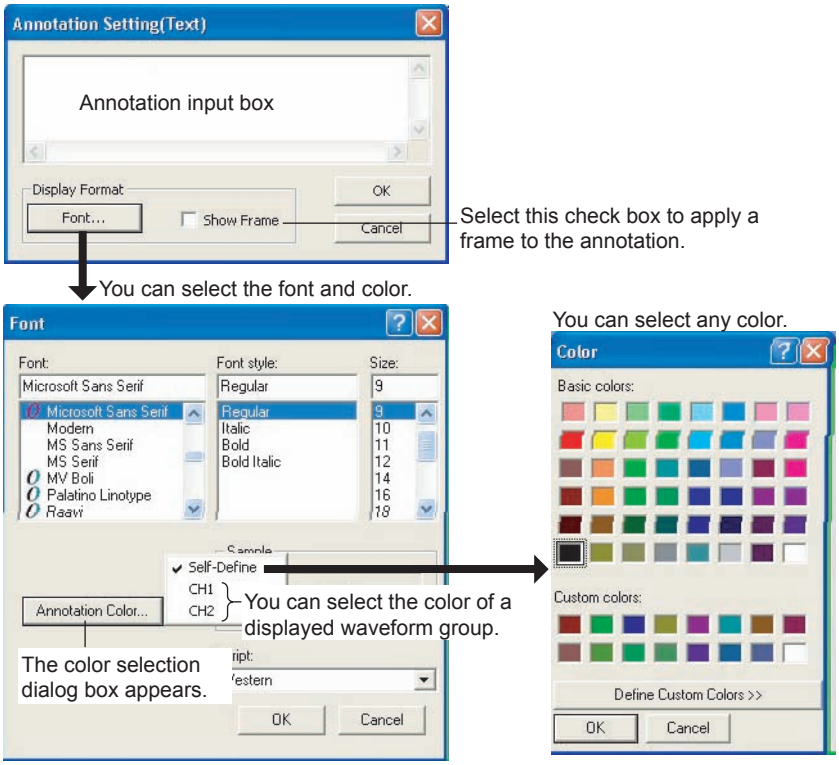


Annotation-Compatible Windows

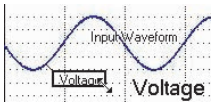
- Text, DeltaT, and DeltaV annotations can be inserted into the main waveform display window, zoom waveform display window, and XY waveform display window.
- Marker, Delta marker, and waveform parameter annotations can be inserted into the main waveform display window and zoom waveform display window.
- Only DeltaT annotations can be inserted into logic waveforms.

Text Pointer Icon: A

If you select a text annotation and double-click in the waveform view or on a waveform, the following settings dialog box is displayed. You can set the annotation display format. If you double-clicked on the waveform, a waveform-linked annotation is inserted.

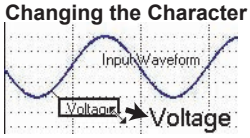


Display Example



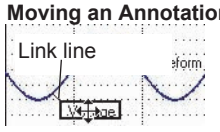
Annotation with frame

Changing the Character Size



Select the annotation, then drag the square.

Moving an Annotation

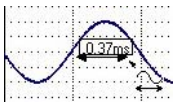


Select the annotation, then drag it.
If a link line flows outside of the waveform view when zooming or changing the scale, the link line disappears.

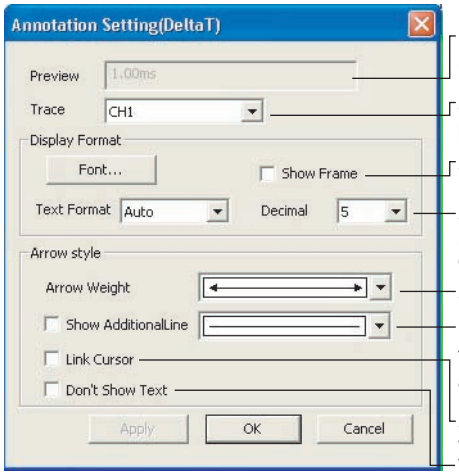
DeltaT Pointer Icon:

When you select a DeltaT annotation and perform procedure a or b below in the waveform view, the X axis value is displayed.

a. Drag horizontally.



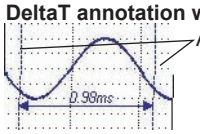
b. Double-click to display the dialog box below. You can set the trace (waveform) to which the annotation is linked, the display format, the arrow style, and other items. The measurement range of the new Å~ axis value displayed when you double-click is 2 div.



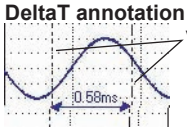
Preview of the value to be displayed (cannot be entered).
Select the trace (waveform) to which to link the annotation.
Set the font and frame (see page 4-23).
Set the text format and decimal places (see section 3.2, but note that "Exponential" is not one of the choices).
Select the arrow thickness.
Draw an additional line through the tip of the arrow. Also select the thickness of the additional line.
Shows a DeltaT annotation spanning vertical cursors.
The value is not displayed.

Display Examples

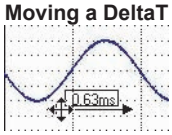
DeltaT annotation with additional line



DeltaT annotation spanning vertical cursor

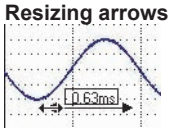


Moving a DeltaT annotation



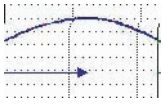
Select an arrow, then drag it. To move just the value, use the same procedure as for moving a text annotation.

Resizing arrows



Select the tip of the arrow, then drag it. The value is updated according to the length of the arrow.

If the arrow flows outside of the waveform view



If an arrow flows outside of the waveform view when zooming or changing the scale, the value is not displayed.

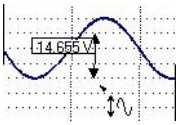
Changing the character size

Same procedure as for text annotations.

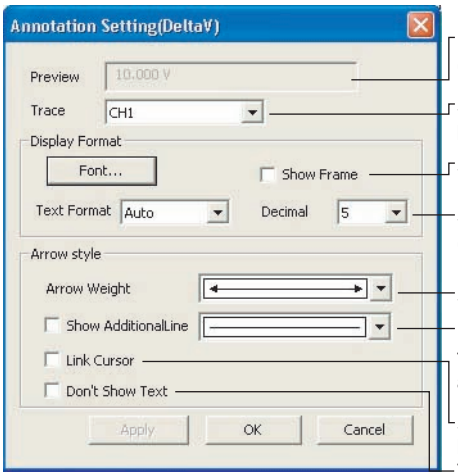
DeltaV Pointer Icon:

When you select a DeltaV annotation and perform procedure a or b below in the waveform view, the Y axis value is displayed.

a. Drag vertically.



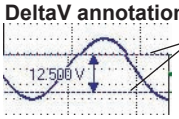
b. Double-click to display the dialog box below. You can set the trace (waveform) to which the annotation is linked, the display format, the arrow style, and other items. The measurement range of the new Y axis value displayed when you double-click is 2 div.



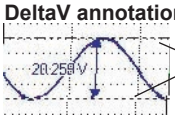
- Preview of the value to be displayed (cannot be entered).
- Select the trace (waveform) to which to link the annotation.
- Set the font and frame (see page 4-23).
- Set the text format and decimal places (see section 3.2).
- Select the arrow thickness.
- Draw an additional line through the tip of the arrow. Also select the thickness of the additional line.
- Shows a DeltaV annotation spanning horizontal cursors.
- The value is not displayed.

Display Examples

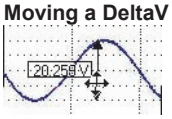
DeltaV annotation with additional line



DeltaV annotation spanning horizontal cu

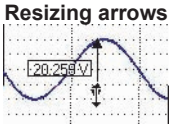


Moving a DeltaV



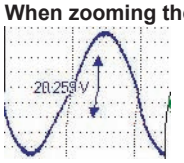
Select an arrow, then drag it. To move just the value, use the same procedure as for moving a text annotation.

Resizing arrows



Select the tip of the arrow, then drag it. The value is updated according to the length of the arrow.

When zooming the waveform vertically



The length of the arrow does not change even when zoomed.
The value is updated according to the zoom ratio.

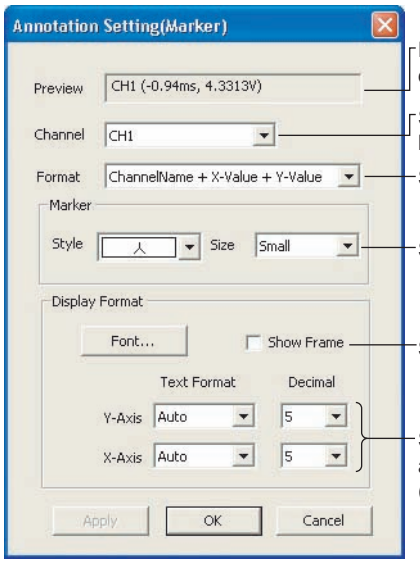
Changing the character size

Same procedure as for text annotations.

Markers Pointer Icon:

With marker annotations, the trace, X axis value, and Y axis value at the double-clicked point are displayed. If you select a marker annotation and double-click the waveform, the settings dialog box below is displayed.

- You can set the trace (waveform) to which the annotation is linked, the format, the marker style, and other items.
- There are four marker styles. Each time you insert a marker annotation, a new style is used.



Preview of the annotation to be displayed (cannot be entered).

Select the trace (waveform) to which to link the annotation.

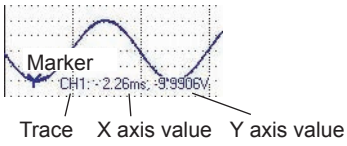
Select the displayed items.

Select the marker style and size.

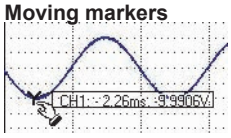
Set the font and frame (see page 4-23).

Set the Y (vertical) and X (horizontal) axis text format and the decimal places (see section 3.2).

Display Examples

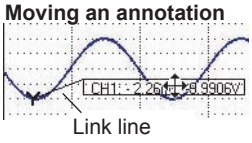


Moving markers



Select the marker, then drag it. Only the marker moves. The value is updated according to the new marker location.

Moving an annotation



Select the annotation, then drag it. Only the annotation moves.
If a link line flows outside of the waveform view when zooming or changing the scale, the link line disappears.

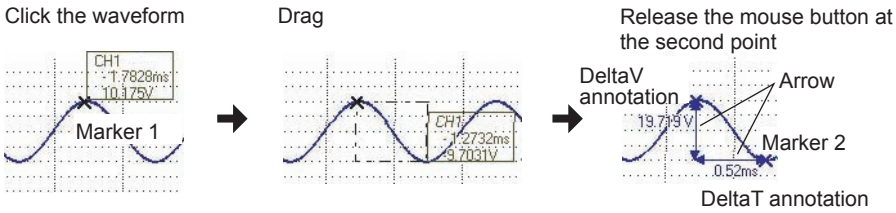
Changing the character size

Same procedure as for text annotations.

Delta Marker Pointer Icon:

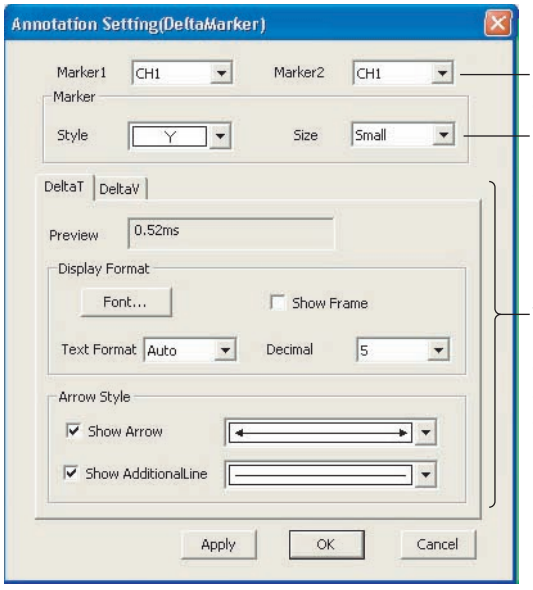
With Delta marker annotations, the DeltaT annotation (X axis value) and DeltaV annotation (Y axis value) are displayed between two markers.

- Select the Delta marker annotation, then drag starting from any one point on the waveform to any other point on the waveform. A DeltaT annotation and DeltaV annotation appear between the two markers.
- If a Delta marker is placed between two different traces, only the Delta T annotation is displayed.



Double-click on an annotation to display the settings dialog box below.

- The target trace (waveform), marker style, and other items relating to markers can be set.
- There are four marker styles. Each time you insert a marker annotation, a new style is used.
- You can set the display format, arrow style, and other items relating to DeltaT and DeltaV annotations. Click the DeltaT or DeltaV tab to display the corresponding settings.



Select the target trace (waveform) for each marker.

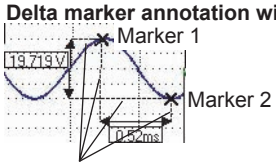
Select the marker style and size. The style and size of paired markers 1 and 2 are the same.

You can set the type of DeltaT and DeltaV annotation displayed with the Delta marker annotation. See the explanation of each annotation on the previous page.

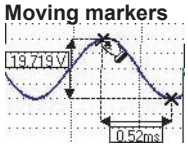
- Clear the Show Arrow check box to hide the annotation's arrow and value.
- There are no cursor linking and hide value options such as those for DeltaT and DeltaV annotations on the previous page.

Display Examples

Delta marker annotation with additional line

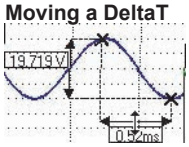


Moving markers



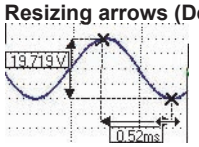
Select the marker, then drag it. The arrow length, value, and additional line are updated according to the new marker location.

Moving a DeltaT



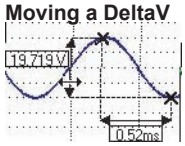
Select the arrow of the DeltaT annotation, then drag it. To move just the value, use the same procedure as for moving a text annotation.

Resizing arrows (DeltaT annotation only)



Select the tip of the arrow, then drag it. The marker is moved and the value is updated according to the length of the arrow.

Moving a DeltaV



Select the arrow of the DeltaV annotation, then drag it. To move just the value, use the same procedure as for moving a text annotation.

If the arrow flows outside of the waveform view

With Delta marker annotations, if a DeltaT or DeltaV annotation arrow flows outside of the waveform view when zooming or changing the scale, the value is not displayed.

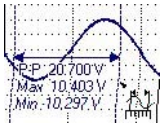
Changing the character size

Same procedure as for text annotations.

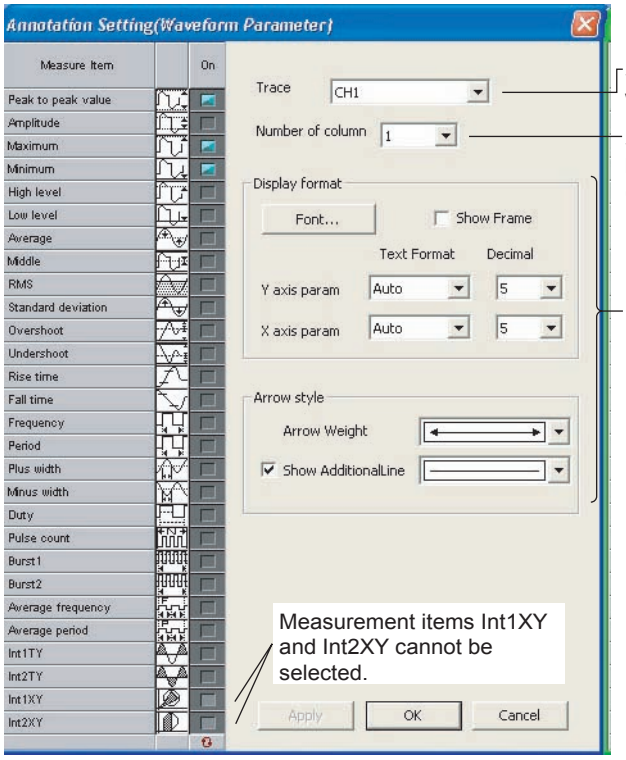
Waveform Parameters **Pointer Icon:**

When you select a waveform annotation and perform procedure a or b below in the waveform view, the measured value of the waveform parameter is displayed.

a. Drag horizontally.



b. Double-click to display the dialog box below. You can set the measured items, the trace (waveform) to which the annotation is linked, the display format, the arrow style, and other items.
The measurement range of the new waveform parameter displayed when you double click is 2 div.



Select the trace (waveform) to which to link the annotation.

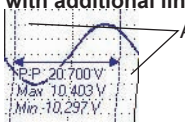
Select the number of horizontally-displayed items (columns).

Set the font and arrow type displayed with the waveform parameter annotation. See the explanation of the DeltaT and DeltaV annotations on the previous page.

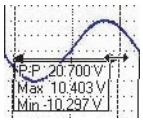
- Under Vertical axis parameters, set the vertical axis waveform parameter text format and decimal places. Under Horizontal axis parameters, set the horizontal axis waveform parameter text format and decimal places.
- There are no cursor linking and hide value options such as those for DeltaT and DeltaV annotations.

Display Examples

Waveform parameter annotation with additional line

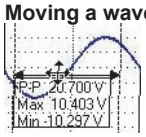


Resizing arrows

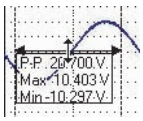


Select the tip of the arrow, then drag it. The value is updated according to the length of the arrow.

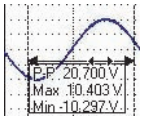
Moving a waveform parameter annotation



Select the arrow of a waveform parameter annotation, then drag it. To move just the value, use the same procedure as for moving a text annotation.



As you begin to move it vertically, the mark indicating the direction o motion becomes ↕.



As you begin to move it horizonta the mark indicating the direction o motion becomes ↔. The value is updated according to the measurement range of the new location.

If the arrow flows outside of the waveform view

If an arrow flows outside of the waveform view when zooming or changing the scale, the value is not displayed.

Changing the character size

Same procedure as for text annotations.

Copying and Pasting Annotations

Place the pointer on an annotation or window and right-click to carry out the following operations.

Operation	When pointing to an annotation	When pointing on the window
New	No	Yes
Delete	Yes	No
Copy	Yes	No
Paste	No	Yes
Edit	Yes	No

Saving and Loading Annotations

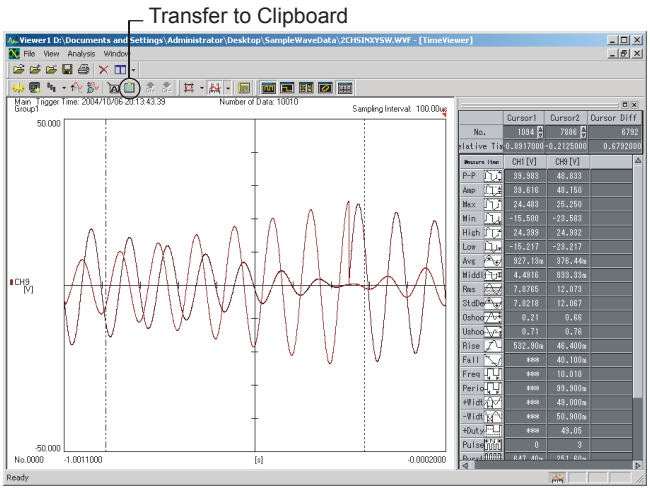
- When saving setting information, only non-linked annotations are saved. When saved setting information is loaded, only non-linked annotations are recalled.
- For information on saving setting information, see section 5.5.

4.6 Transferring a Waveform View to the Clipboard

Procedure

Transferring a Waveform View to the Clipboard

Click to transfer the viewer window you are viewing as image data to the clipboard. You can see the image by executing a paste command in an application that can handle image data.



Note

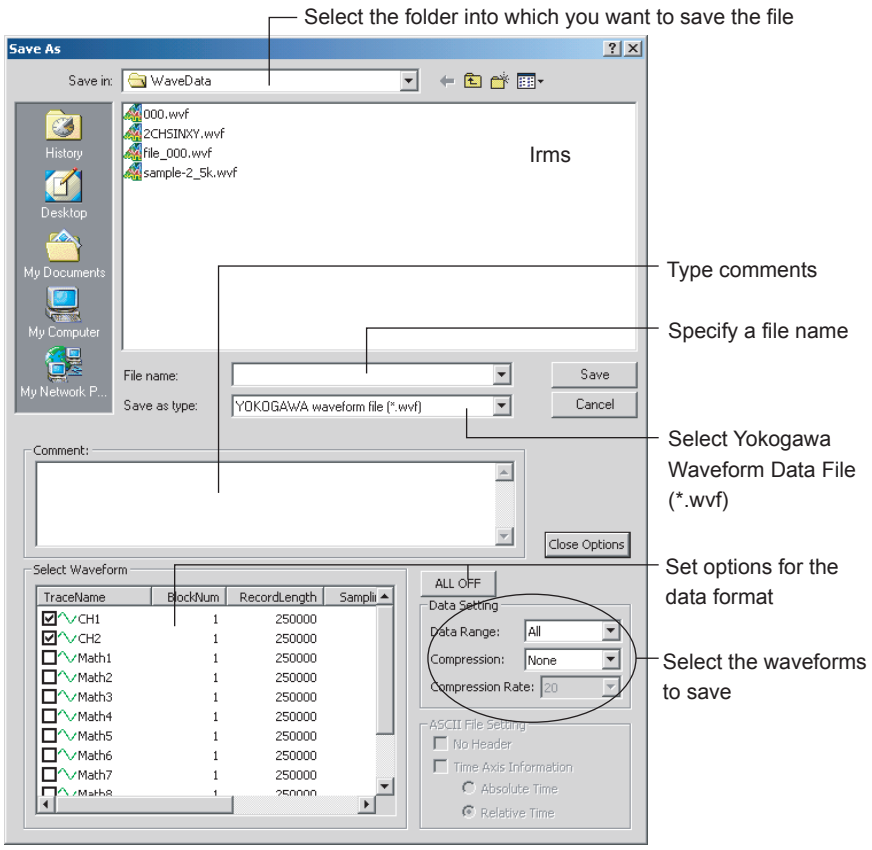
Only the waveform view is transferred to the clipboard without any image of the menu bars and other functional components.

5.1 Saving Waveform Data

Procedure

Saving Waveform Data in Binary Format

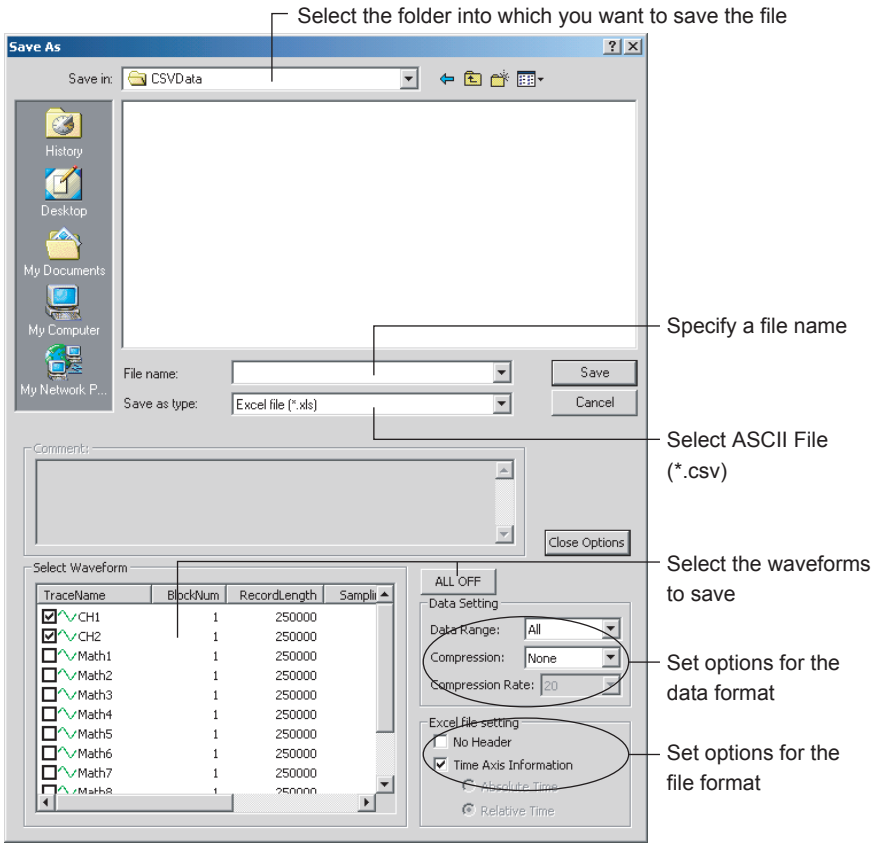
Click or select **File > Save As** to display the Save File dialog box. Select the folder into which you want to save the file, specify the file name, select **Yokogawa Waveform Data File (*.wvf)** in Files of type, set any other required options, and then click the **Save**. To set the options, click the **More Options**.



Saved WVF files can not be loaded on the measuring instrument*.
* DL series, SL1400, SL1000

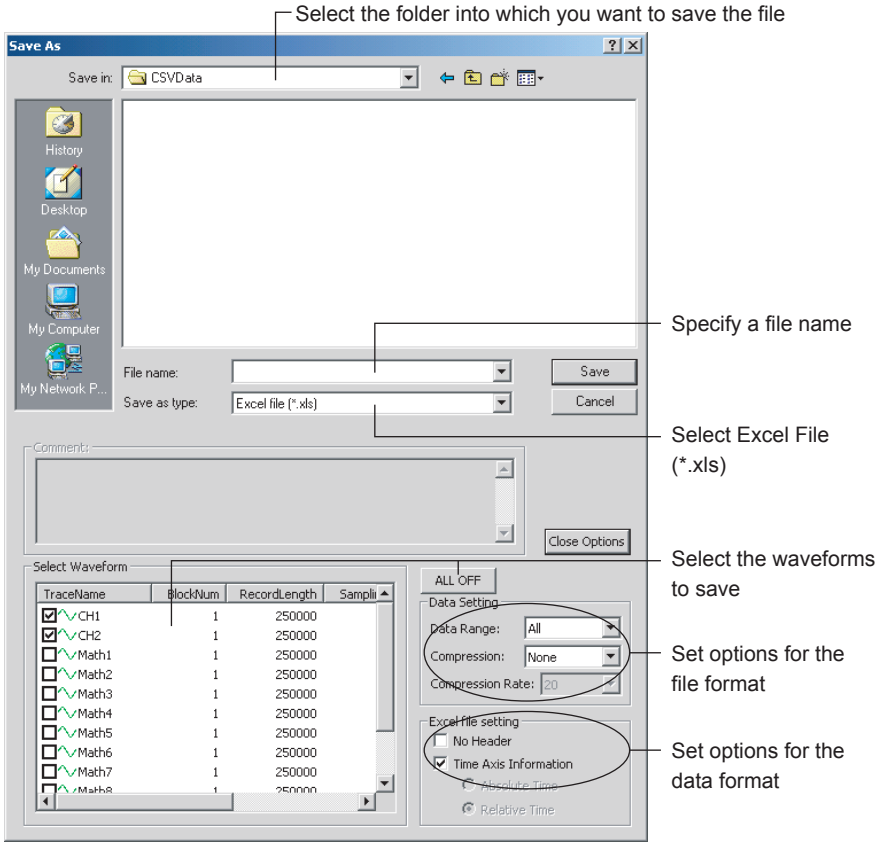
Saving Waveform Data in ASCII Format

Click or select **File > Save As** to display the Save File dialog box. Select the folder into which you want to save the file, specify the file name, select **ASCII File (*.csv)** in Files of type, set any other required options, and then click the **Save**. To set the options, click the **More Options**.



Saving Waveform Data in XLS Format

Click or select **File > Save As** to display the Save File dialog box. Select the folder into which you want to save the file, specify the file name, select **Excel File (*.xls)** in Files of type, set any other required options, and then click the **Save**. To set the options, click the **More Options**.



Saving Waveform Data as a Floating Point Decimal File.

For products of version 1.60 or later, you can save waveform data as a floating point decimal file.

Saving as a Floating Point Decimal File

Click , or click File > Save As to display the file save dialog box. Type or select a path and file name, select floating decimal point (*.fld) for the file type, specify any required options, then click Save. To specify options, click Details.

Save Format of Floating Point Decimal Files

You can save the displayed waveform data to an FLD file (single precision floating point decimal format). FLD files can be loaded by general purpose analysis software such as MATLAB.

Floating Point Decimal File Save Options

When saving waveform data to FLD files, you can specify options in addition to the waveform to save.

- Data save range: Select all points, zoom range, or cursor range
- Compression: Select none, PP, or simple thinning
- Compression ratio: Specify from the following when using compression

Select 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, or 10000

Explanation

Files Saved in Binary Format

Displayed waveform data are saved in WVF format (a Yokogawa proprietary format). The saved data consists of the active waveform data and that for the block checked in the history window.

Options for Saving Binary Files

When you save waveform data in WVF format, you can not only select the waveforms to save but you can also set the following options:

- Range to save: Select All, Zoom Range, or Cursor Range
- Compression: Select None, PP Comp, or Decim
- Compression Rate: Selectable when Compression is specified.
  Select 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, or 10000.

Files Saved in ASCII Format

Files saved in ASCII format conform to CSV format.

Note

- For waveform data that is divided into blocks, you can save only one block in ASCII format (CSV file).
- Data cannot be saved to WVF or CSV format if the file size exceeds 2 GB.

Options for Saving CSV Files

When you save waveform data in CSV format, you can not only select the waveforms to save but also set the following options:

Data format options:

- Range to save: Select All, Zoom Range, or Cursor Range
- Compression: Select None, PP Comp, or Decim
- Compression Rate: Selectable when Compression is specified.

Select 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, or 10000.

File format options:

- Header: Select whether to set a header
- Time-Axis: Select whether to set information about the time-axis
- Relative Time/Absolute Time: Selecting Absolute or Relative Time (Available When the Time Axis Information Check Box Is Selected)

Relative Time: Displays the measurement time relative to the trigger position. Displays and saves data to the left of the on-screen trigger position as negative values, and data to the right as positive values.
Example: -0.00499984, 0 (Trigger position), 0.00499984

Absolute Time: Displays and saves data at the actual measured time (per the clock).
Year/Month/Day Hour:Minute:Second
Example: 2007/07/07 18:03:47.4750002,
2007/07/07 18:03:47.48,
2007/07/07 18:03:47.4849998

Files Saved in XLS Format

Files saved in XLS format conform to MS Excel format.

Options for Saving XLS Files

When you save waveform data in XLS format, you can not only select waveforms to save but also set the following options:

Data format options:

- Range to save: Select All, Zoom Range, or Cursor Range
- Compression: Select None, PP Comp, or Decim
- Compression Rate: Selectable when Compression is specified.
  Select 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, or 10000.

File format options:

- Header: Select whether to set a header
- Time-Axis: Select whether to set information about the time-axis

Note

For waveform data divided by the block, you can save only one block you focus on into the XLS format.

File names:

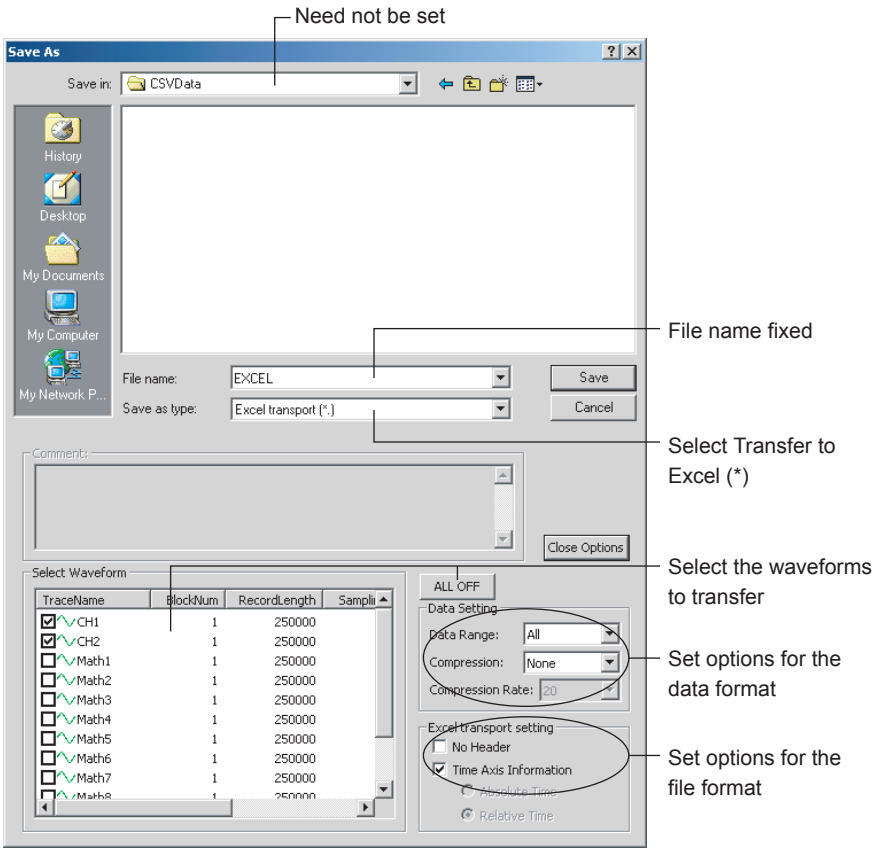
The following file names cannot be used.
AUX, CON, PRN, NUL, CLOCK, COM0 to COM9, and LPT0 to LPT9

5.2 Transferring Waveform Data into Excel

Procedure

Transferring Waveform Data into Excel

Click or select **File > Save As** to display the Save File dialog box. Select **Excl transport (*)** in Files of type, set any other required options, and then click the **Save**. To set the options, click the **More Options**.



Explanation

Transfer to Excel

The Transfer to Excel command directly redirects data for the selected waveforms to an Excel sheet. Clicking the **Save** button automatically starts up Excel and then plots the waveform data onto an Excel sheet according to the specified format options.

Note

- If there are a number of channels, Transfer to Excel may take a long time to complete in some operating environments. In such a case, save the data into a CSV file, and then read the file into Excel.
- Using the mouse to close the sheet opened by the Transfer to Excel feature causes Xviewer to malfunction when you execute Transfer to Excel again. If you need to close the sheet and execute Transfer to Excel again, close the first sheet, quit Xviewer, and then execute Transfer to Excel again.
- When the measured values exceed the measurement range, or the size of the computed waveform data is smaller than that of the measured waveform data, the waveform data is not saved. In this case, a value of “65535” is written into each cell.

Options for Transfer to Excel

When you transfer waveform data to Excel, you can not only select the waveforms to transfer but also set the following options:

Data format options:

- Range to save: Select All, Zoom Range or Cursor Range
- Compression: Select None, PP Comp, or Decim
- Compression Rate: Selectable when Compression is specified.
  Select 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, or 10000.

File format options:

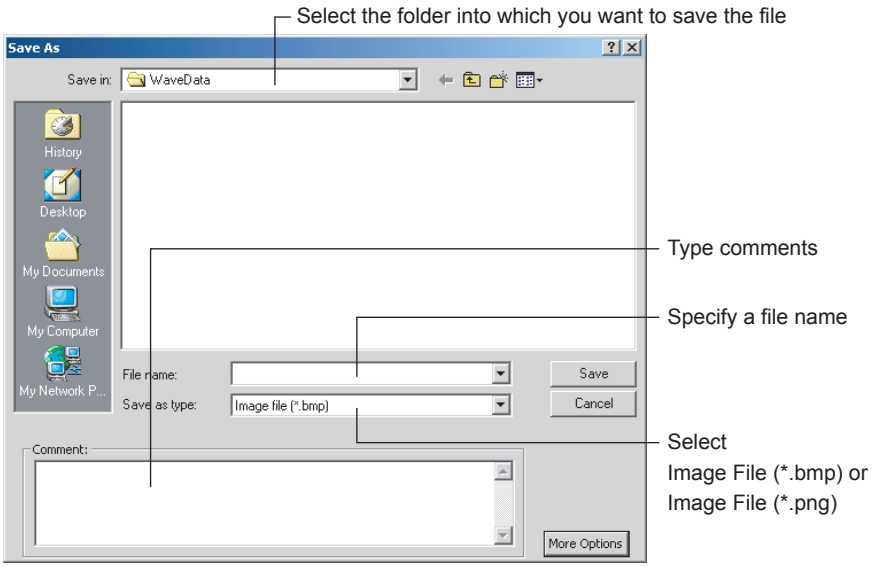
- Header: Select whether to set a header
- Time-Axis: Select whether to set information about the time-axis

5.3 Saving Waveform Data in a View

Procedure

Saving Waveform Data in a View

Click or select **File > Save As** to display the Save File dialog box. Select the folder into which you want to save the file, specify the file name, select **Image File (*.bmp)** or **Image file (*.png)** in Files of type, and then click the **Save**.



Explanation

Files Saved in BMP/PNG Format

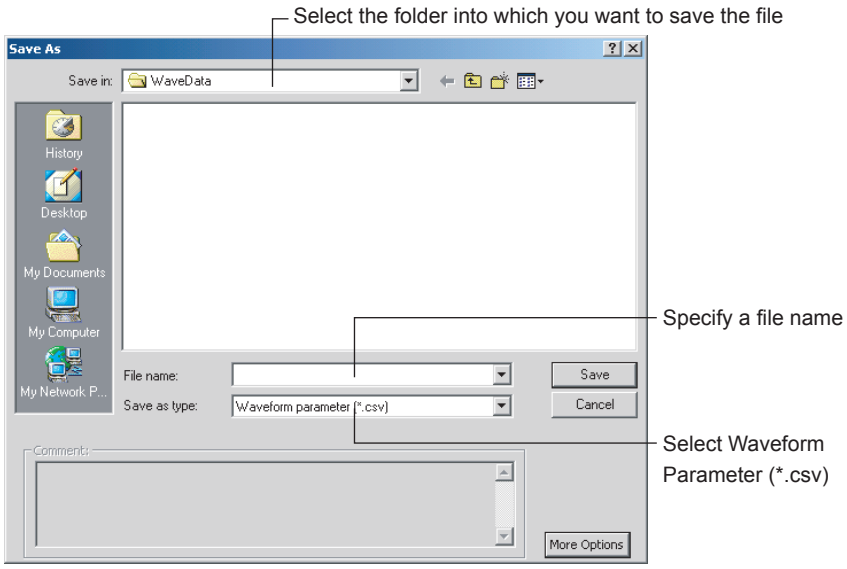
You can save the viewer window you are viewing into an image data file in either BMP or PNG format. You can attach comments to the file, but the file can include only one line of comments.

5.4 Saving Automated Measurement Values forWaveform Parameters

Procedure

Saving Values Automated Measurement Waveform Parameters

Click or select **File > Save As** to display the Save File dialog box. Select the folder into which you want to save the file, specify the file name, select **Waveform Parameter (*.csv)** in Files of type, and then click the **Save**.



Explanation

Files Saved in Waveform Parameters (*.csv) Format

You can save the automated measurement values for the specified waveform parameters (values displayed in the measurement result display window) in a .csv file.

Saved Data

Among the automated measurement values, the following data is saved.

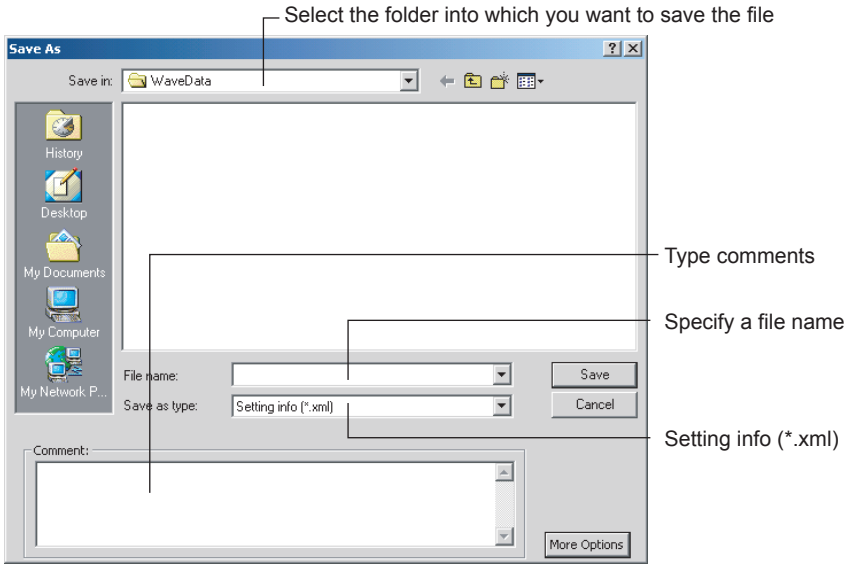
- Measurement results for block selected in the history window
- Trace measurement results for channel setting for which the cursor display is ON

5.5 Saving the Display Settings

Procedure

Saving the Display Settings

Click or select **File > Save As** to display the Save File dialog box. Select the folder into which you want to save the file, specify the file name, select **Setting info (*.xml)** in Files of type, and then click the **Save**.



Explanation

Files Saved in Setting info (*.xml) Format

You can save the display settings specified for the viewer window you are viewing into a .xml file. You can also include comments. Loading a Display Setting file already saved applies the display settings in the file to waveform views.

Automatically Saving Display Settings

With software products of version 1.34 or later, when waveform data analysis is finished, the corresponding display settings are automatically saved.
The next time waveform data is loaded, the corresponding display settings are automatically loaded.

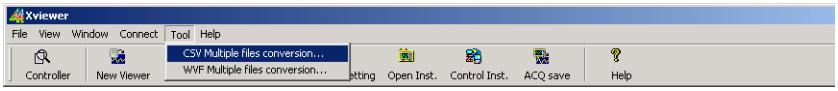
Note

The function that saves display settings automatically uses the MD5 Message Digest Algorithm by RSA Data Security, Inc.

5.6 Converting Multiple Waveform Data Files to CSV Files

Procedure

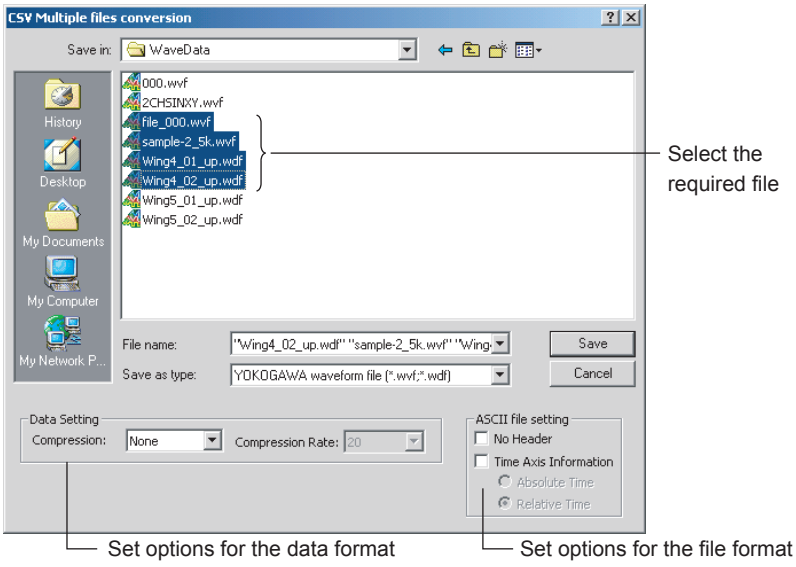
1. Close the viewer window.
2. Click **Tools > CSV Multiple files conversion** on the Xviewer tool bar to display the CSV Multiple files conversion dialog box.



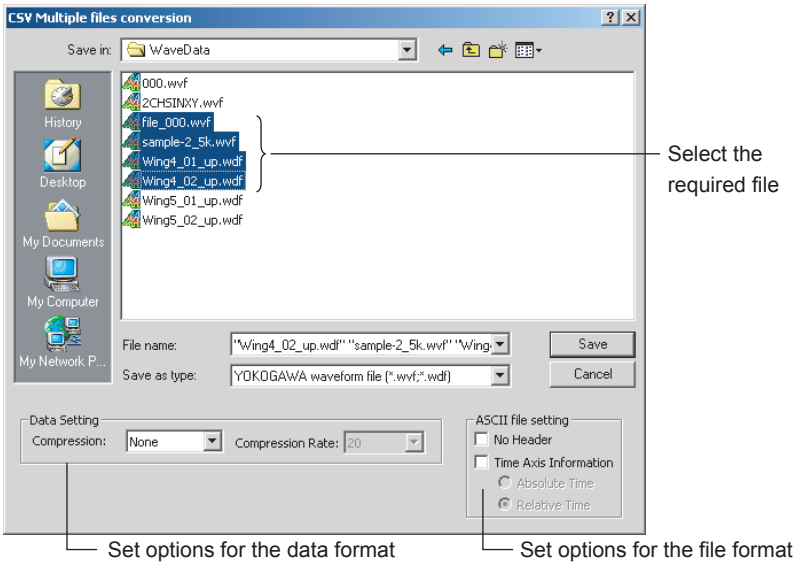
3. Select the files (WVF or WDF files)* to convert and options and click **Save**. The Browse For Folder dialog box opens.

* You can select one or more WVF and WDF files for conversion. To select multiple files, hold down the Ctrl key while clicking to select them. When multiple files are selected, all are converted to CSV files collectively.

Example with multiple selected files



4. Select a save destination folder and click **OK**. The converted CSV files are saved in the selected folder.
   Converted files are only given the csv file name extension.



Explanation

Setting Options

You can specify the following two options for waveform data files to convert to the CSV format:

Data format options:

- Compression: Select None, PP Comp, or Decim
- Compression Rate: Selectable when Compression is specified.
  Select 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, or 10000.

File format options:

- Header: Select whether to set a header
- Time-Axis: Select whether to set information about the time-axis
- Relative Time/Absolute Time: Selecting Absolute or Relative Time (Available When the Time Axis Information Check Box Is Selected)

  Relative Time: Displays the measurement time relative to the trigger position. Displays and saves data to the left of the on-screen trigger position as negative values, and data to the right as positive values.
  Example: -0.00499984, 0 (Trigger position), 0.00499984

  Absolute Time: Displays and saves data at the actual measured time (per the clock).
  Year/Month/Day Hour:Minute:Second
  Example: 2007/07/07 18:03:47.4750002,
  2007/07/07 18:03:47.48,
  2007/07/07 18:03:47.4849998

Records Horizontally Arranged

```
CH1-Record1-data001, CH2-Record1-data001
CH1-Record1-data002, CH2-Record1-data002
CH1-Record1-data003, CH2-Record1-data003
        ⋮                    ⋮
CH1-Record1-data100, CH2-Record1-data100

CH1-Record2-data001, CH2-Record2-data001
CH1-Record2-data002, CH2-Record2-data002
CH1-Record2-data003, CH2-Record2-data003
        ⋮                    ⋮
CH1-Record2-data100, CH2-Record2-data100

CH1-Record3-data001, CH2-Record3-data001
CH1-Record3-data002, CH2-Record3-data002
CH1-Record3-data003, CH2-Record3-data003
        ⋮                    ⋮
CH1-Record3-data100, CH2-Record3-data100
```

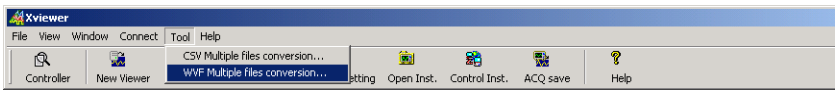
Note

Data cannot be saved to CSV format if the file size exceeds 2 GB.

5.7 Converting WDF Files to WVF Files

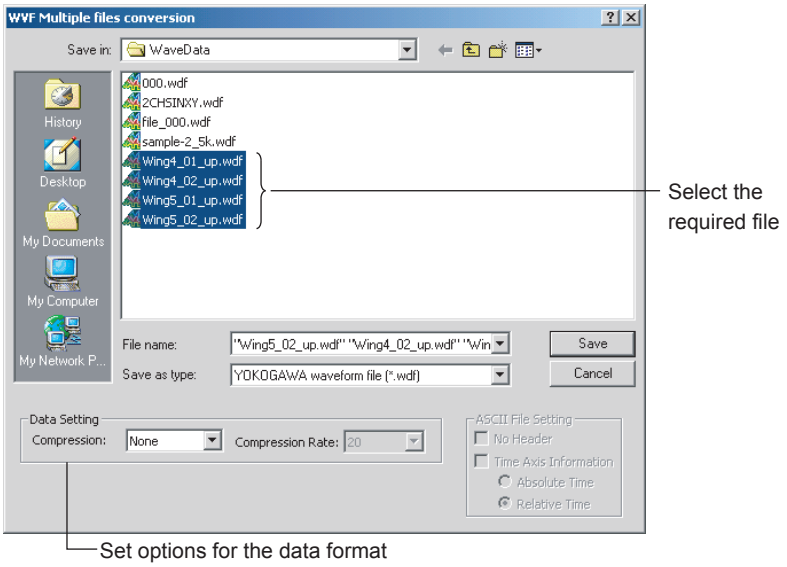
Procedure

1. Close the viewer window.
2. Click **Tools > WVF Multiple files conversion** on the Xviewer tool bar to display the WVF Multiple files conversion dialog box.



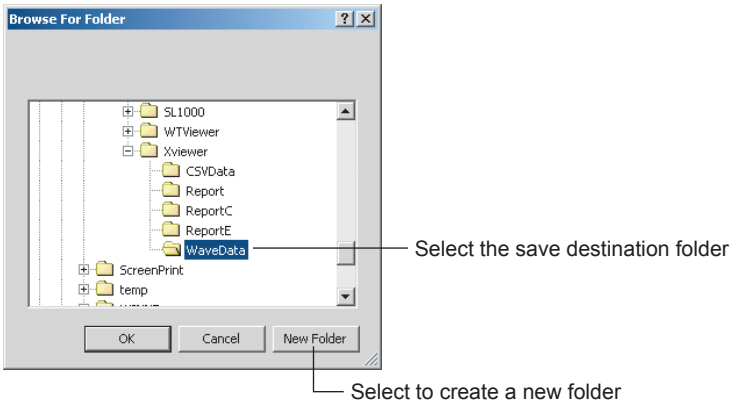
3. Select the WDF files* to convert and options and click **Save**. The Browse For Folder dialog box opens.
   * You can select one or more WDF files for conversion. To select multiple files, hold down the Ctrl key while clicking to select them. When multiple files are selected, all are converted to WVF files collectively.

Example with multiple selected files



4. Select a save destination folder and click **OK**. The converted WVF files are saved in the selected folder. Converted files are only given the wvf file name extension.

   Converted WVF files can not be loaded on the measuring instrument.



Explanation

Setting Options

When converting a WDF file containing measured waveform data to WVF format, you can select WVF format options. The options that can be specified are as follows.

Data format options:

- Compression: Select None, PP Comp, or Decim
- Compression Rate: Selectable when Compression is specified.
  Select 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, or 10000.

Note

Data cannot be saved to WVF format if the file size exceeds 2 GB.

5.8 Converting WDF/WVF Files to FLD Files (version 1.60 or later)

Procedure

1. Close the viewer window.
2. On the Xviewer tool bar, click Tools > Convert to FLD to display the FLD Conversion dialog box.
3. Select the WDF/WVF files to convert* and any options, then click Save. The browse folders dialog box is displayed.

   * You can select one or more WDF/WVF files for conversion.

   To select multiple files, hold down the Ctrl key while clicking to select them. When multiple files are selected, all are converted to FLD files collectively.
4. Select a save destination and click OK. The converted FLD file is saved in the selected folder.

   Converted files are only given the fld file name extension.

   Converted FLD files can not be loaded on the measuring instrument.

Explanation

Option Settings

When converting a WDF file containing waveform data to FLD format, you can select FLD format options.

Data Settings

- Compression: Select none, PP, or simple thinning
- Compression ratio: Specify from the following when using compression

Select 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, or 10000

Note

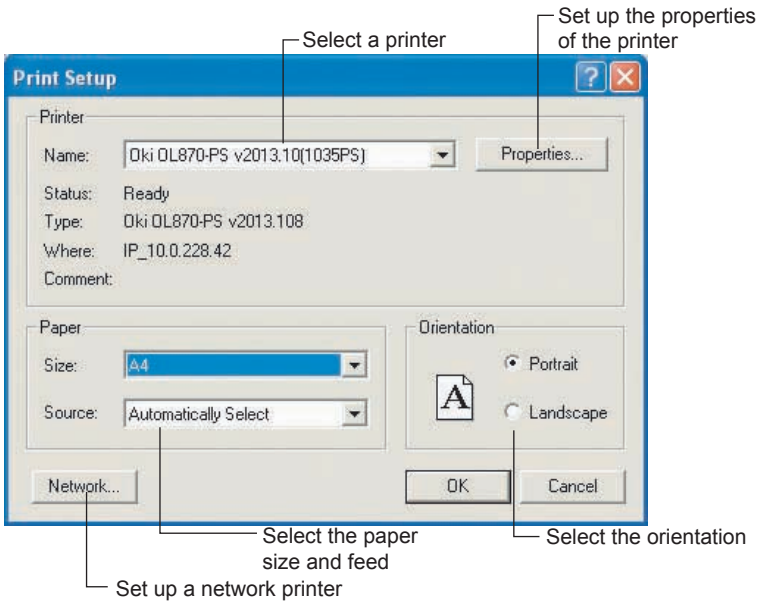
- Data cannot be saved to FLD format if the file size exceeds 2 GB.
- FLD files are in single precision floating point decimal format.
- FLD files can be loaded by general purpose analysis software such as MATLAB.

6.1 Setting Up a Printer

Procedure

Setting Up a Printer

Select **File > Printer Setup....** to display the Printer Setup dialog box.
Select a printer and specify the paper size, orientation, and other settings in the dialog box, and then click **OK**.



Explanation

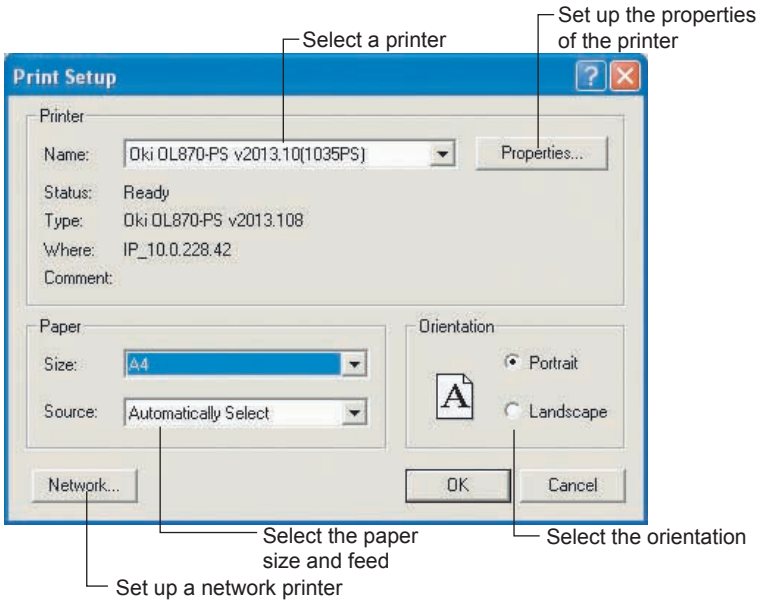
Set up the printer according to your system configuration.

6.2 Printing Displayed Waveforms

Procedure

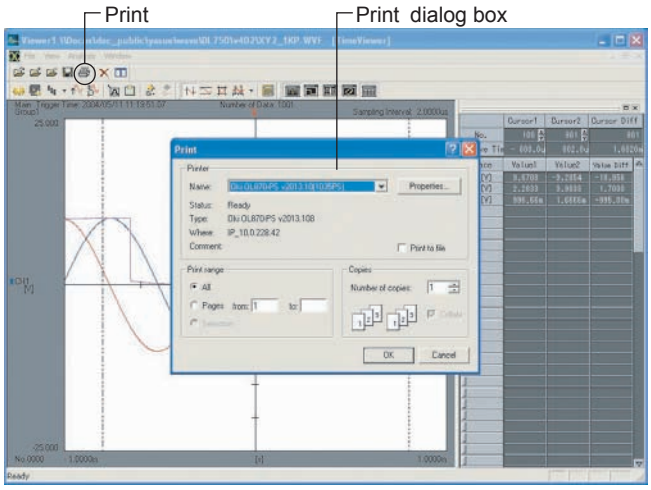
Setting Up the Print Format

Select **File > Print Format** to display the Print Format dialog box. Fill in the comment, header, and footer fields, specify the print mode settings, and then click the **OK**.



Printing

Click to display the Print dialog box. Click **OK** to start printing with the settings you specified in the Print Format dialog box.



Explanation

Printable Information

You can specify the printing of the following types of information on printouts:

- **COMMENTS** : Comments (printed under the waveforms.)
- **HEADER** : Page header
- **FOOTER** : Page footer

Print Mode

Set the following items for the PRINT MODE selections:

- **DISPLAY** : Mode in which the display on the screen is printed as is
- **LONG** : Prints the waveforms (main waveform display window), separating them by the zoom rate specified for the zoomed waveform display window.(The entire waveform view is printed by the zoomed waveform display window, starting from the left end. In the dialog box, the size of the zoomed waveform display window is in units of one window*.) Set a value of 1 to 10 for “WINDOW/PAGE” for the number of windows to be printed on one page.

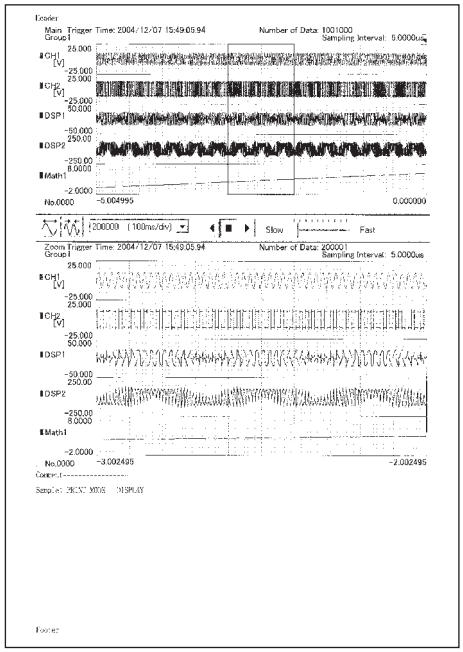
* The number of windows printed equals (the number of points displayed in the main waveform display windows) divided by (the number of points displayed in the zoomed waveform display windows), or (quotient of the division) + 1.

Print Preview

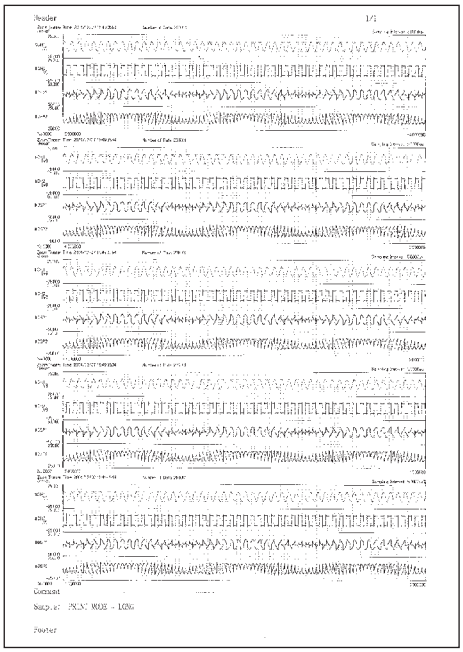
Click the **Preview** or select **File > Print Preview** to switch the viewer window to the print preview. This lets you check the layout of the sheet you are going to print. To proceed with printing, click the **Print**.

Printout Sample

Print Mode : DISPLAY



Print Mode : LONG



Printing Background

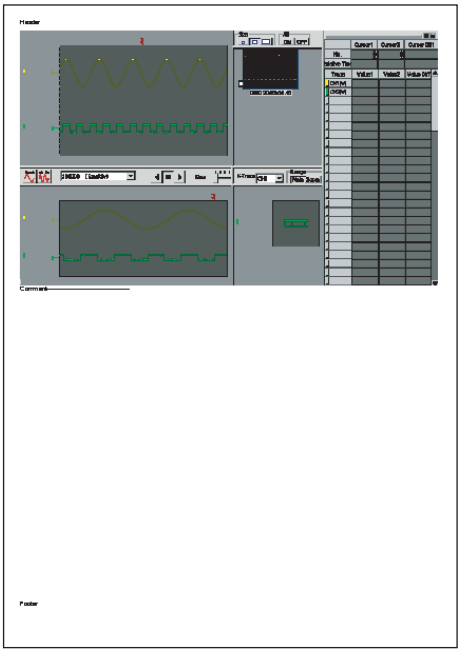
Select a background color to use when printing.

Select: Prints with a white background.

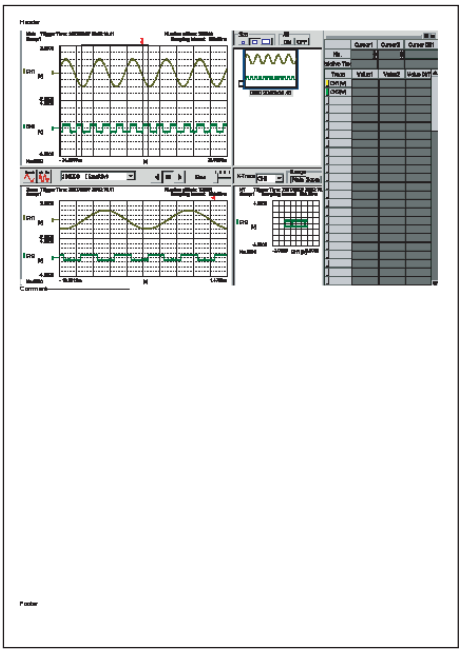
Clear: Prints with the background color displayed on screen.

Printing Example

When printing with the on-screen background color



When printing with the background color set to white

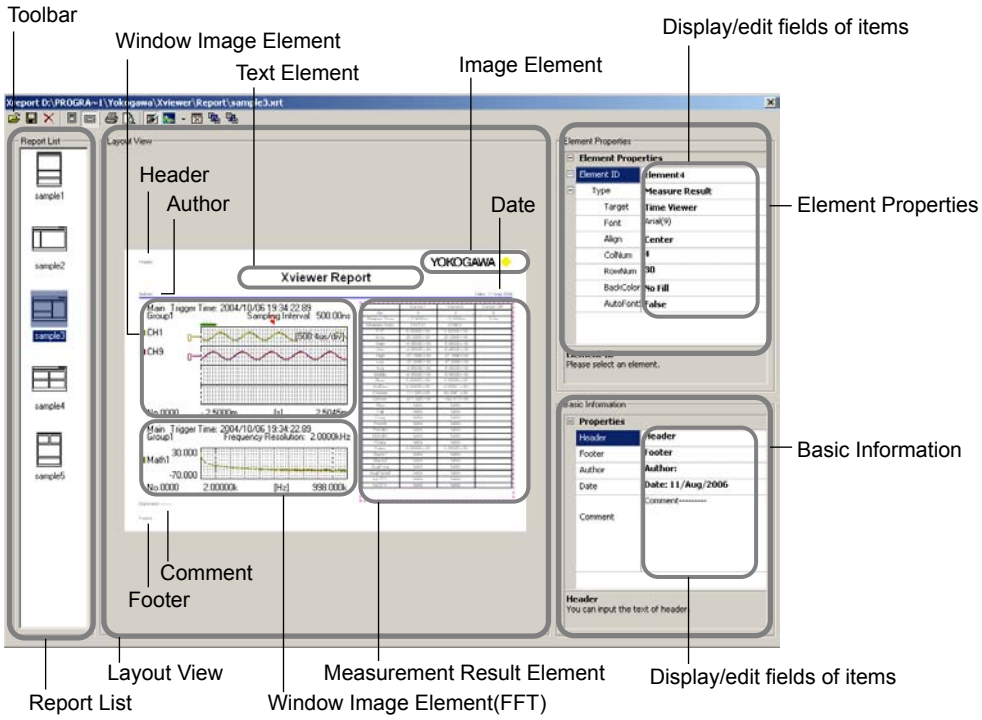


7.1 Using the Report Function (Xreport)

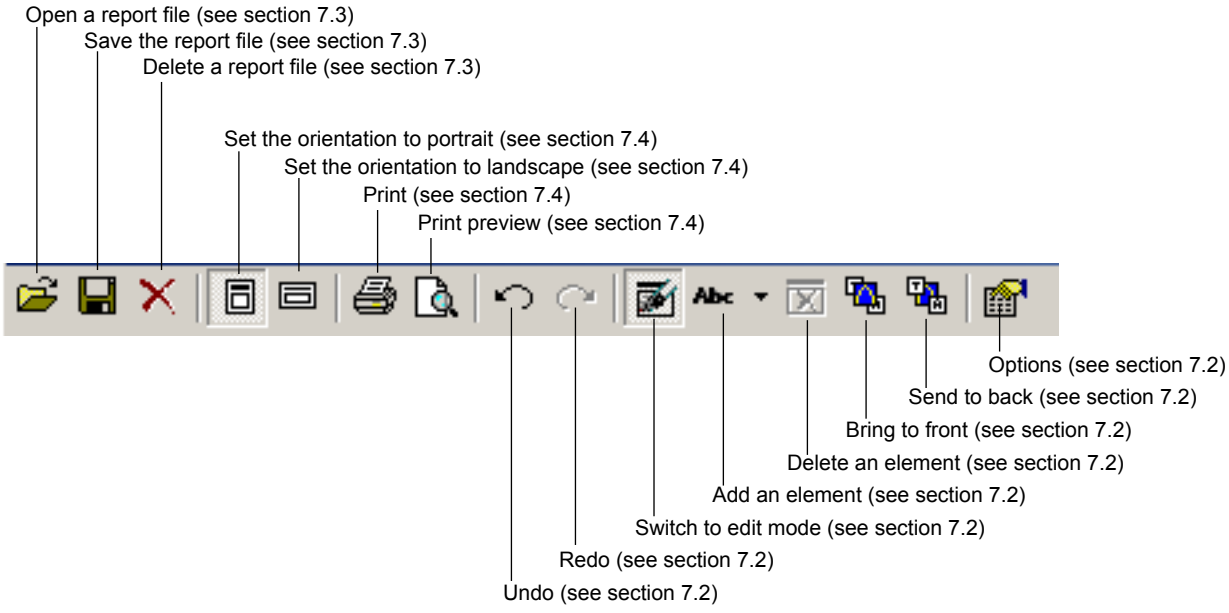
Procedure

Starting the Report Function

While waveforms are shown on the Viewer window, choose **Create Report** from the **File menu**. The Xreport window opens.



• Toolbar


Open a report file (see section 7.3)
Save the report file (see section 7.3)
Delete a report file (see section 7.3)
Set the orientation to portrait (see section 7.4)
Set the orientation to landscape (see section 7.4)
Print (see section 7.4)
Print preview (see section 7.4)
Options (see section 7.2)
Send to back (see section 7.2)
Bring to front (see section 7.2)
Delete an element (see section 7.2)
Add an element (see section 7.2)
Switch to edit mode (see section 7.2)
Redo (see section 7.2)
Undo (see section 7.2)

Explanation

Starting the Report Function

If you start the report function, the Xreport window opens. The window shows the waveform that was shown on the Viewer window.

Xreport Window

The Xreport window consists of the following four items.

- Report List: Lists the report files with a layout image.
- Layout View: Shows elements such as waveforms and measured results.
- Element Properties: Shows/edits the properties of each element.
- Basic Information: Shows/edits the header, footer, author, date, and comment.

Report List

The report files saved in the folder below are listed with a layout image.

Xviewer installation folder > Report folder
(Windows 2000 or XP:
The default location is C:\Program Files\Yokogawa\Xviewer\Report
Windows Vista:
C:\Users\User Name\Documents\YOKOGAWA\Xviewer\Report)

The report file stores position information and properties of each element that is positioned on the Layout View as well as basic information. The report file that you select on the Report List is used to lay out the Layout View.
By default, the five report files (Sample1 to 5) are available. You can edit these files.

Layout View

The Layout View consists of elements, the header, the footer, the date, and the comment. There are four types of elements available, and multiple elements can be placed on the Layout View. When you create an element, a unique ID is assigned in order. Element1 cannot be deleted.

- Text Element: An element for placing text.
- Window Image Element: An element for placing the image of the Viewer Window. You can select the main, zoom, or XY display of the Time Viewer waveform or the main, zoom, XY display of the FFT Viewer waveform.
  However, FFT Main, FFT Zoom, and FFT XY can be placed only if the FFT Viewer is shown on the Viewer Window.
- Measurement Result Element: An element for placing the measured results. The measured results do not need to be shown on the Viewer Window.
- Image Element: An element for placing the image data. A jpg, bmp, tif, or png image can be placed.

Element Properties

Shows the common properties and the properties by type for the selected element. You can change the properties by turning Edit Mode ON.

- **Common Properties**

  Element ID: Assigned automatically when an element is created. It cannot be changed.

  Type: Text, Window Image, Measure Result, or Image.

- **Properties by Type**

  Text

  Text: Text (can be edited regardless of the ON/OFF state of Edit Mode).

  Font: Font, style, size, and so on to be used.

  Align: Alignment (right, left, or center).

  BackColor: Background color.

  Window Image

  Target: Time Main, Time Zoom, Time XY, FFT Main, FFT Zoom, or FFT XY.

  Measure Result

  Target: Time Viewer or FFT Viewer.

  Font: Font, style, size, and so on to be used.

  Align: Alignment (left, center, or right).

  ColNum: Number of columns

  RowNum: Number of rows

  BackColor: Background color.

  AutoFontSize: Automatic adjustment of the font size (True or False).

  Image

  File Path: The path to the image file. Specified in the Open dialog box.

  H Align: Horizontal position (Left, Center, or Right).

  V Align: Vertical position (Top, Center, or Bottom).

  Zoom: Magnification (Select Auto, Fix, 0.50, or 2.00. You can also set an arbitrary magnification.)

Basic Information

Shows the header, footer, author, date, and comment. You can change the information regardless of whether Edit Mode is ON. Basic information is shown at a fixed position in the Layout View and cannot be deleted.

Note

- If you start the report function (Xreport), the contents of the Viewer Window are laid out in the Layout View according to the settings of the most recent report file in the following folder.
  Xviewer installation folder > Report folder
  (The default location is C:\Program Files\Yokogawa\Xviewer\Report.)
- The report list can show up to 64 report files.
- If you turn Edit Mode ON, you can change the size of each element by dragging the frame.
- Font size designation is invalid if AutoFontSize is set to True.

7.2 Editing Reports

Procedure

Selecting the Layout

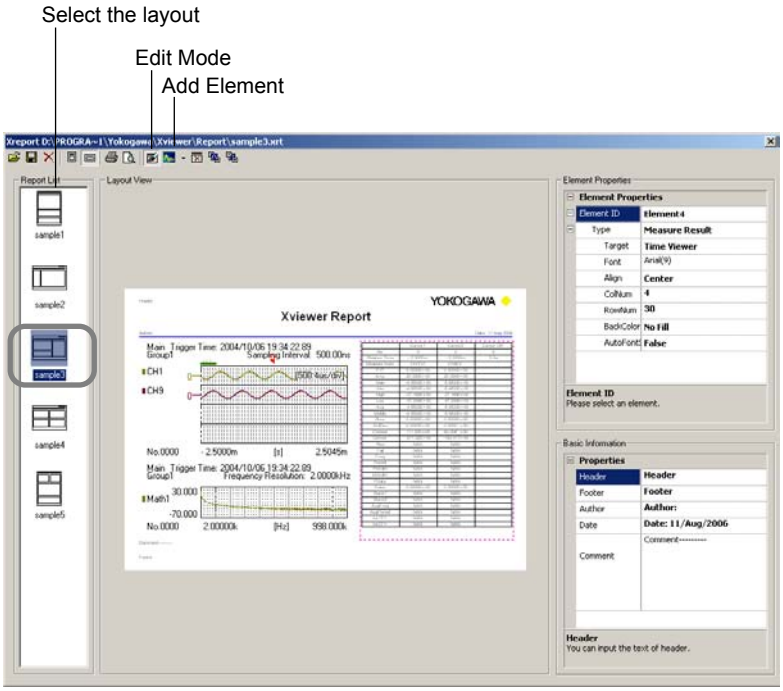
Click the desired layout from the Report List. Layout View, Element Properties, and Basic Information are set according to the selected report file.

Enabling Edit Mode

Click the **Edit Mode** on the toolbar. When Edit Mode is ON, you can add or delete elements and change the element properties.

Adding an Element

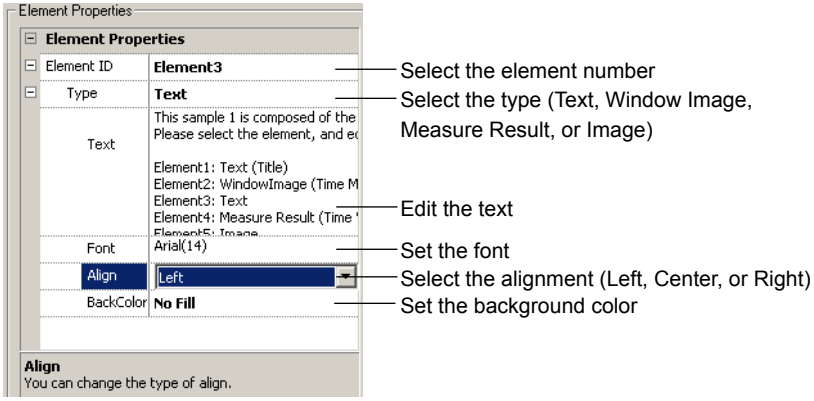
Select the element you want to add from the drop-down menu of the **Add Element** on the toolbar. A crosshair cursor appears in the Layout View. Drag the cursor to add an element of the desired size.



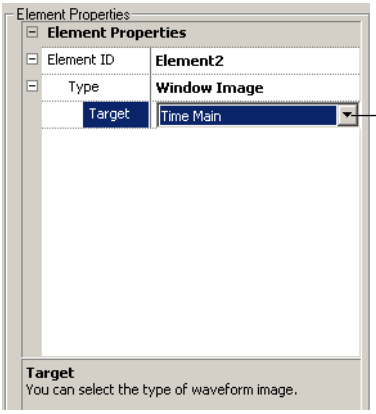
Changing the Element Properties

Click the item field you want to change.

- **Editing a Text Element**

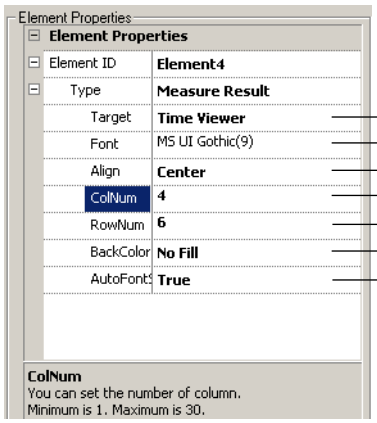


- **Editing a Window Image Element**



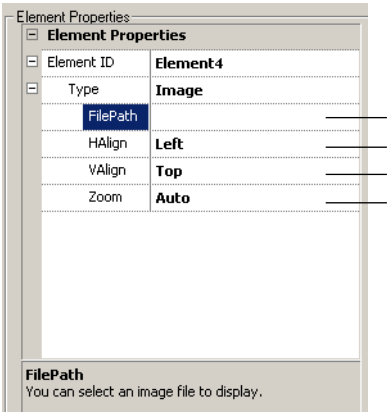
Select the waveform to be displayed (Time Main, Time Zoom, Time XY, FFT Main, FFT Zoom, or FFT XY)

- **Editing a Measure Result Element**



Turn ON/OFF the automatic adjustmentof the font size (True/False)
Set the font
Select the alignment (Left, Center, or Right)
Set the number of columns
Set the number of rows
Set the background color
Turn ON/OFF the automatic adjustment of the font size (True/False)

- **Editing an Image Element**



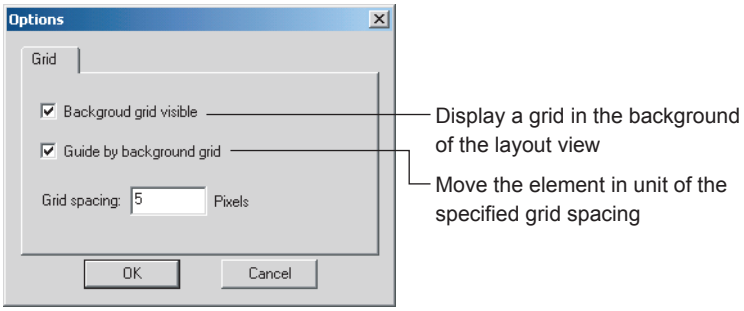
IrmsIrmsIrmsIrmsIrms
Select the horizontal position (Left, Center, or Right)
Select the vertical position (Top, Center, or Bottom)
Set the magnification of the image file*1 (Auto, Fix, 0.50, 2.00, or an arbitrary magnification)

*1 Auto: Adjusts the size so that the image fits in the Image Element frame.
Fix: Shows the image at the original size.
0.50: Shows the image at one-half the original size.
2.00: Shows the image at twice the original size.
Any: Shows the image by expanding or reducing the image to an arbitrary size.

Deleting an Element
Select the element you want to delete in the Layout View. Click the **Delete Element** on the toolbar. The selected element is deleted.

Sending the Element to the Back or Bringing the Element to the Front
Select the element you want to move and click the **Send to Back** or **Bring to Front**.

Aligning the Elements
Select whether to align the elements with the grid. Click the **Options** on the toolbar. The Options dialog box opens. Show/hide the grid on the layout view or set the grid spacing.



Undoing or Redoing
Undo or redo an element editing operation.

Changes the Basic Information
Click the Header, Footer, Author, Date, or Comment field and change the contents.

Explanation

Report List
Lists the report files (.xrt extension) that are stored in the folder below. The most recent file is shown at the top of the list; the oldest file is shown at the bottom of the list.
Xviewer installation folder > Report folder
(The default location is C:\Program Files\Yokogawa\Xviewer\Report.)

Adding an Element
When Edit Mode is ON, you can select the element to be added from the following:
- Add text (Text Element).
- Add a window image (Window Image Element).
- Add a measured result (Measure Result Element).
- Add an image (Image Element).

Changing the Element Properties
You can change the properties. The items that you can change vary depending on the type.

Changes the Basic Information
The following basic information is shown in the report.
Header, Footer, Date, Author, and Comment
The Basic Information cannot be turned OFF. However, if you leave the text field empty, nothing will be displayed.

Aligning the Elements

The selectable range is 1 to 100.

Undoing or Redoing

You can undo or redo a single edit operation in the layout view.

- Add or delete an element.
- Move an element or change the properties
- Set the layout view (landscape or portrait)
- Basic information of the report (header, footer, date, author, and comment)

7.3 Saving, Loading, or Deleting Report Files

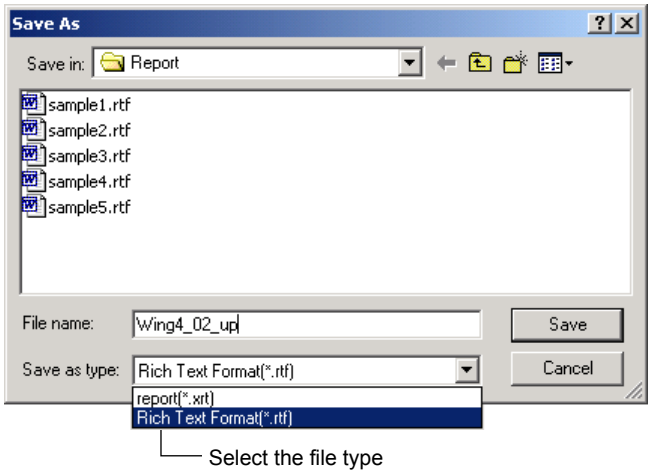
Procedure

Loading a Report File

Click the **Open** on the toolbar. The Open dialog box opens. Select the report file you want to load, and click **Open**. The report file settings are used to lay out the Layout View.

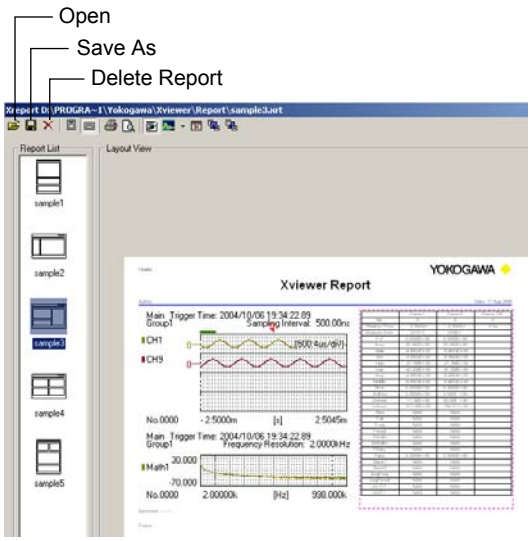
Saving a Report File

Click the **Save As** on the toolbar. The Save As dialog box opens. Set the destination, file name and file type, and click **Save**. The current settings are saved.



Deleting a Report File

Select the file you want to delete from the Report List, and click the **Delete Report** on the toolbar. The selected report file is deleted.



Explanation

Loading a Report File

Use this command to open a report file that is not shown in the Report List.
The only reports that can be loaded are the ones of file type *.xrt.

Saving a Report File

If you save the report file in the folder indicated below, the report file is shown in the Report List.

Xviewer installation folder > Report folder
(The default location is C:\Program Files\Yokogawa\Xviewer\Report.)

The report file types that can be saved are *.xrt (report format) and *rtf (rich text format).

Note

Report files saved in rich text format (*.rtf) can be edited in Microsoft Word. However they can not be edited in WordPad.

Deleting a Report File

The report files in the folder indicated below can be deleted.

Xviewer installation folder > Report folder
(The default location is C:\Program Files\Yokogawa\Xviewer\Report.)

Note

If you open a new report file, the report file that was open up to that point is discarded.

7.4 Printing Reports

Procedure

Selecting the Print Orientation

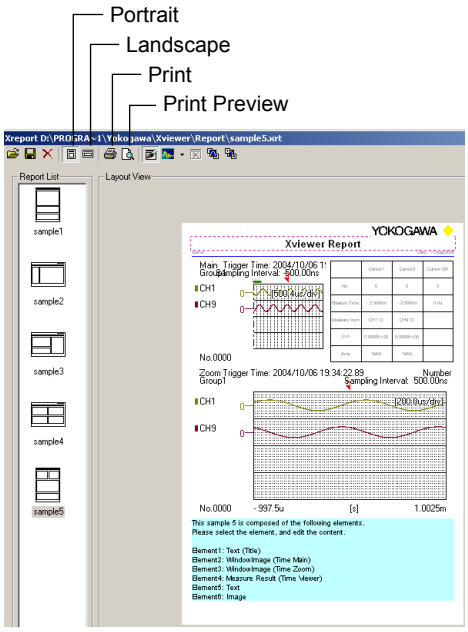
Click the **Portrait** or **Landscape** on the toolbar.

Print Preview

Click the **Print Preview** on the toolbar. A preview is shown on the screen.

Printing a Report

Click the **Print** on the toolbar. The Print dialog box opens. Set the printer, the range, the number of copies, and so on, and click **OK**. The report is printed on the specified printer.



8.1 Connecting to the Instruments

Note

Before attempting to use this function, connect the PC to the instrument using an appropriate communications cable. For details on how to make this connection, see the manual provided with your instrument.

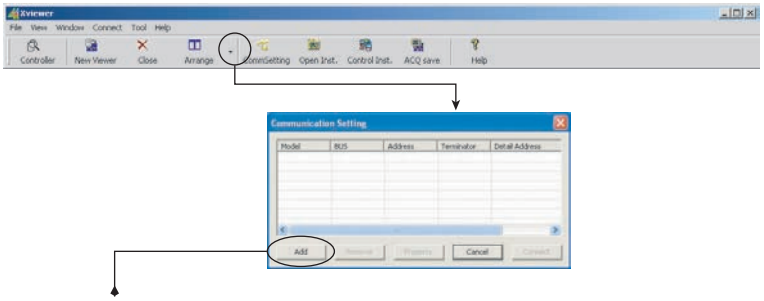
Procedure

Setting Up/Adding a Connection

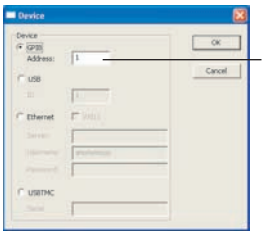
On the **Xviewer tool bar**, click the **CommSetting** to open the Communication Setting dialog box. Then, click the **Add** to open the Devices dialog box, make the settings for the connection interface and communications conditions, and then click **OK**.

Note

- If connections to instruments have already been registered, those connections will be displayed as a list. Select the required the instrument and then click the Connect to establish the connection with the instrument.
- Up to 16 connections can be registered.

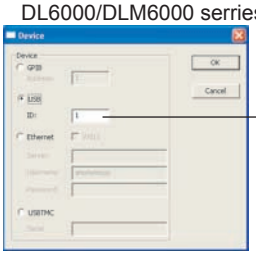


• GP-IB connection



Input the GP-IB address of the instrument to be connected (0 to 30)

• USB conneciton (Other than the DL9000/SB5000 Series, SL1000 DLM2000 series, DL6000/DLM6000 serries, and DL850)

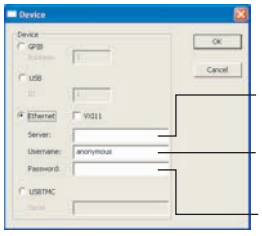


Input the USB ID number of the instrument to be connected (1 to 127)

• USB conneciton (DL9000/SB5000 Series, SL1000, DLM2000 series, DL6000/DLM6000 serries, and DL850)

Input the serial number of the instrument to be conncted (9-digit)

• Network connection (Other than the SL1000 DLM2000 series, DL6000/DLM6000 serries, and DL850)

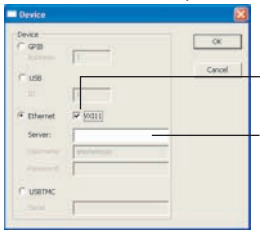


Input the IP address of the instrument to be connected

Input the network user name for the instrument to be connected

Input the network password for the instrument to be connected

• Network connection (SL1000 DLM2000 series, DL6000/ DLM6000 serries, and DL850)



Check the VXI11

Input the IP address of the instrument to be connected

Modifying a Connection

On the **Xviewer tool bar**, click the **CommSetting** to open the Communication Setting dialog box. Select the required the instrument and then click the **Properties** to open the Devices dialog box, change the settings as needed and then click **OK**.

Removing a Connection

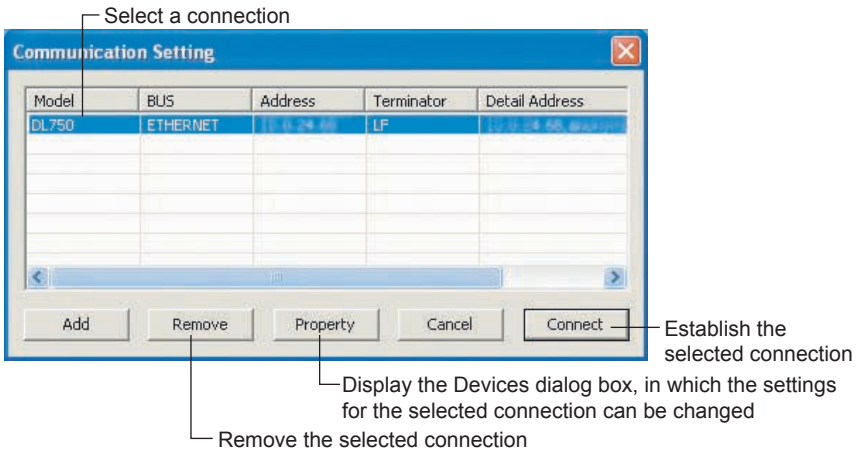
On the **Xviewer tool bar**, click the **CommSetting** to open the Communication Setting dialog box. Select the required the instrument and then click the **Remove** to remove the selected connection.

Establishing a Connection

On the **Xviewer tool bar**, click the **CommSetting** to open the Communication Setting dialog box. Select the required the instrument and then click the **Connect** to establish the connection with the instrument.

Note

If the instrument contains a very large number of files, it may take some time to establish the connection.



Ending a Connection

A connection with the instrument is ended when you exit from Xviewer.

Note

The connection with the instrument cannot be ended while a file is being transferred.

Explanation

Setting Contents

Ensure that the interface settings and communication conditions are the same as for the instrument to which you want to connect. Check the setting contents using the following menu.

Address/ID Number

DL750 series, DL1600 series, DL1700E series
: MISC > Remote Cntl

DL7400 series : MISC > Remote Cntrol

DL9000 series, SB5000 series : SYSTEM > Remote Control > GPIB

SL1400 : MENU > Remote Cntl

DLM2000 Series : UTILITY > Remote Control > Device > GPIB

DL6000/DLM6000 Series : UTILITY > Remote Control > GPIB

DL850/DL850V : UTILITY > Remote Ctrl > Device > GPIB

Server

DL750 series, DL1600 series, DL1700E series, DL7400 series
: MISC > Network > TCP/IP Setup

DL9000 series, SB5000 series : SYSTEM > Network > TCP/IP Setup >Configuration

SL1400 : MENU > Network > TCP/IP Setup

SL1000 : DISPLAY key (Displays the communication parameter screen)

DLM2000 Series : UTILITY > Network

DL6000/DLM6000 Series : UTILITY > Network > TCP/IP Configuration

DLM850/DL850V : UTILITY > Network > TCP/IP

User Name (for the Network interface)

DL750 series, DL1600 series, DL1700E series
: MISC > Remote Cntl > User Account

DL7400 series : MISC > Remote Cntrol > User Account

DL9000 series, SB5000 series : SYSTEM > Remote Control > Network (User Name/Password)

SL1400 : MENU > Remote Cntl > User Account

Serial No. (for the USB interface with the DL9000/SB5000 series, or SL1000, DLM2000 Series DL6000/DLM6000 Series or DL850)

DL 9000 series, SB5000 series : SYSTEM > Overview

SL1000 : The number (instrument number) marked on the name plate of the SL1000.

DLM2000 Series : UTILITY > Overview

DL6000/DLM6000 Series : UTILITY > Overview

DL850/DL850V : UTILITY > Overview

“unknown” Model Name Display

Once you have made the connection settings and, using those settings, a connection is made successfully, the “model name” of the connected device will appear under Model in the Communication Setting dialog box. If a connection cannot be established, however, an error message is displayed and “unknown” appears as the model name. 8-4 IM

Firmware Versions

Xviewer may not be able to establish a connection with the instrument, depending on the firmware version of the software installed in that unit. Xviewer is compatible with the following firmware versions.

DL750 series : Firmware versions 2.50 and later
DL1600 series : Firmware versions 1.12 and later
DL7400 series : Firmware versions 1.23 and later
DL1700E series : All firmware versions
DL9040/DL9140/DL9240 series
: Control Inst is supported by firmware versions 1.64 and later. DL file display and transfer as well as load and save are supported by firmware versions 1.8 and later.
DL9500/DL9700 series : All firmware versions
SB5000 series : All firmware versions
SL1400 : All firmware versions
SL1000 : All firmware versions
DLM2000 series : Control Inst, load and save, and DLM file display and transfer (USB upload and GP-IB download) are supported by firmware versions 1.06 and later. DLM file display and transfer (USB download and VXI-11 download) are supported by all firmware versions.
DL6000/DLM6000 Series : All firmware versions
DL850/DL850V : All firmware versions

Transfer Rate

Model	**Transfer Rate**			
	Download			Upload
	GP-IB	USB	Ethernet	USB
DL1600 series, DL1700E series, DL7400 series, DL750 series, SL1400	150 K to 450 KB/s	300 K to 600 KB/s	400 K to 1 MB/s	5 K to 15 KB/s
DL9000 series	800 KB/s	1.5 MB/s	1 MB/s	5 KB/s
SB5000 series	800 KB/s	1.5 MB/s	1 MB/s	5 KB/s
SL1000	-	9 MB/s	10 MB/s	1 MB/s
DLM2000 series	1 MB/s	5 MB/s	4 MB/s	1 MB/s
DL6000/DLM6000 series	800 KB/s	1.5 MB/s	1 MB/s	5 KB/s
DL850/DL850V	1 MB/s	7 MB/s	5 MB/s	1 MB/s

Note

The transfer rate varies depending on the networking environment and the model being used.

8.2 Displaying a File List

Procedure

Displaying a File List

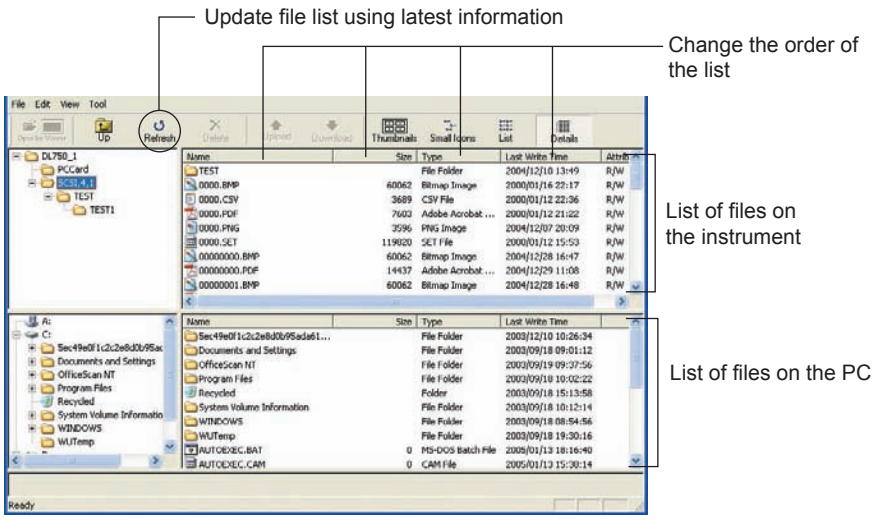
On the **Xviewer tool bar**, click the **Open Inst** to open the Communication Setting dialog box. Select the required the instrument and then click the **Connect** to establish the connection with the instrument and display a file list.

Note

- If a connection has already been established with the required the instrument, the Communication Setting dialog box does not appear and the file list appears immediately.
- When you click the “Control Inst” to enable operation of the instrument from a PC, the “Open Inst” is grayed out.
- If the instrument contains a very large number of files, it may take some time for the file list to appear.

Changing the Order of/Updating the File List

When you click the **Name, Size, Type**, or **Updated** in the file list, the file list is sorted based on that clicked item. Clicking **Update** on the tool bar causes the file list to be refreshed based on the latest information.

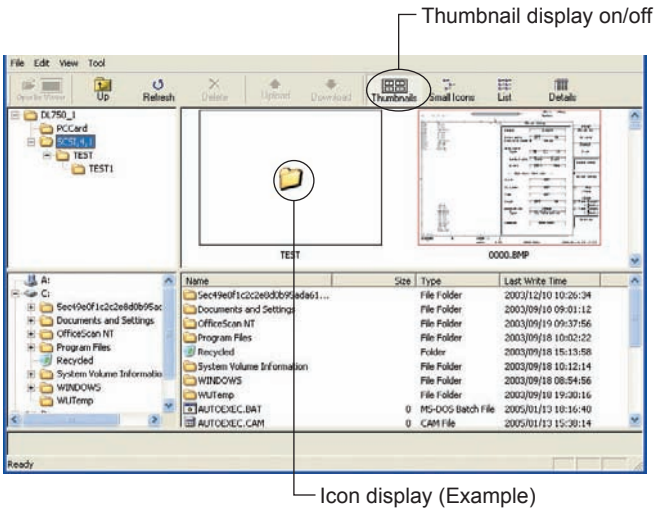

Update file list using latest information
Change the order of the list
List of files on the instrument
List of files on the PC

Thumbnailing Image Files

Clicking **Thumbnails** on the tool bar causes the image files stored on the instrument to be displayed as thumbnails.

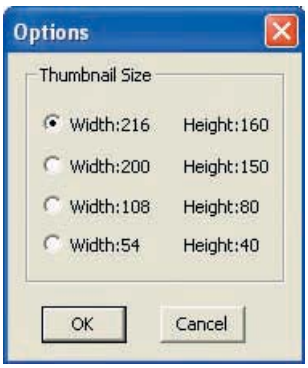
Note

- Files other than image files will be displayed as icons.
- Those image files for which there is no thumbnail file to display will be displayed as icons.



Changing the Size of the Displayed Thumbnails

Select **Tools > Options** on the file list menu bar to display the Option dialog box. Select a size for the thumbnails (width and height), and then click the **OK**.



Explanation

Displaying Realtime Recording Data

For the DL750/DL750P and SL1400

On the SL1400 and DL750/DL750P with firmware version 6.01 or later, the file list of the [SCSI,4,0] folder on the DL750/DL750P/SL1400 can be displayed. The [SCSI,4,0] folder contains data that has been real-time recorded on the DL750/DL750P/SL1400 (.wdf data).

For the DL850 and SL1000

If files were recorded in real time on the SL1000 or DL850 and divided into multiple files, only the first file (****_000.WDF) is displayed.

8.3 Manipulating Files

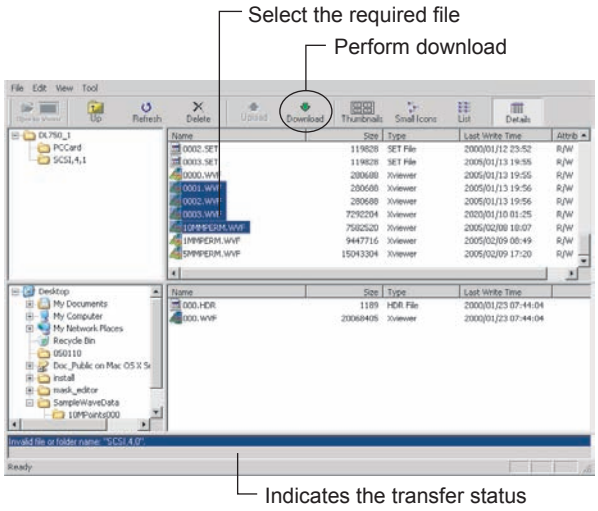
Procedure

Downloading from the Instrument to the PC

If you select a file from the list of files stored on the instrument, the “Download” is enabled. If you then click the **Download**, the selected file is transferred to the PC.

Note

- Multiple files can be specified for transfer.
- While files are being transferred, the connection to the instrument cannot be terminated.
- With the DLM2000 series, if waveform acquisition is in progress, you must stop waveform acquisition before performing file operations such as uploading of files to the DLM2000, downloading of files to the PC, deletion of files, deletion of folders, and creation of new folders.
- If files were recorded in real time on the SL1000 or DL850 and divided into multiple files, all divided files are downloaded when you download the displayed first file (****_000.WDF).

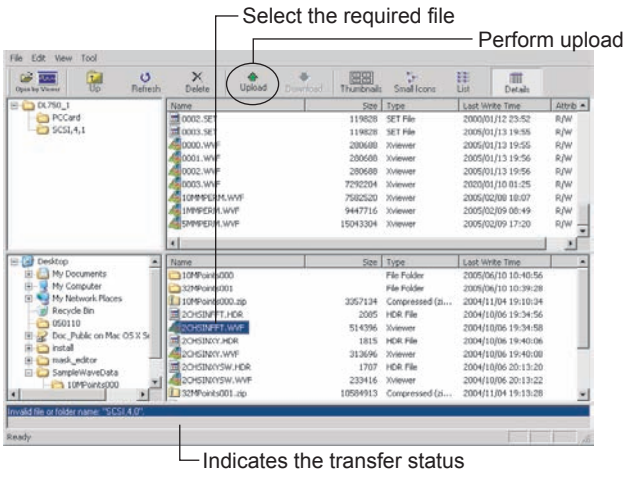


Uploading from the PC to the Instrument

If you select a file from the list of files stored on the PC, the “Upload” is enabled. If you then click the **Upload**, the selected file is transferred to the instrument.

Note

- Files can be transferred from the PC to the instrument (upload) only when the USB interface is being used for the connection.
- Multiple files can be specified for transfer.
- While files are being transferred, the connection to the instrument cannot be terminated.
- The data in the [SCSI,4,0] folder in which the realtime recording data (DL750 series and SL1400) can be downloaded to the PC. However, you cannot create a directory in the folder or upload data to the folder.
- With the DL9000 series, SB5000 series, and DL6000/DLM6000 series files cannot be uploaded to a USB memory connected to the instrument.
- If files were recorded in real time on the SL1000 or DL850 and divided into multiple files, all divided files are uploaded when you upload the displayed first file (****_000.WDF).



Deleting a File

If you select a file from the file list and then click the **Delete**, the selected file is deleted.

Note

- When you delete an image file, the corresponding thumbnail file is deleted at the same time.
- A folder cannot be deleted.
- If files were recorded in real time on the SL1000 or DL850 and divided into multiple files, all divided files are deleted when you delete the displayed first file (****_000.WDF).

Deleting a Folder (SL1000)

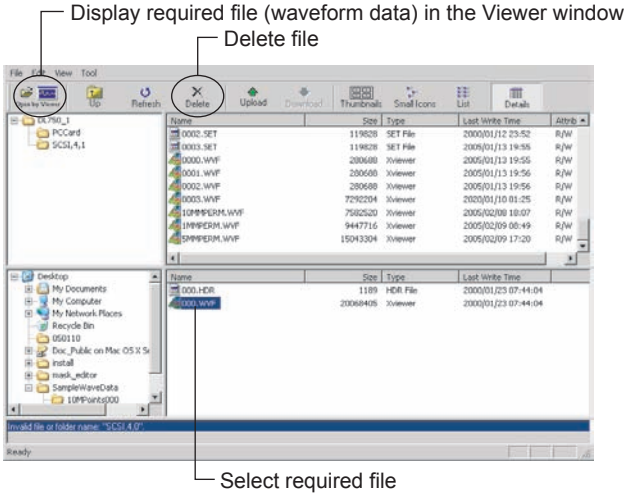
With the SL1000, If you select a folder from the file list and click Delete, the selected folder is deleted.

Note

If you delete a folder, all files within the folder are also deleted at the same time.

Reading a Waveform Data File

If you select a WVF-format waveform data file (*.wvf / *.wdf) from the file list on the PC, the “Open in Viewer” is enabled. If you then click the **Open in Viewer**, the selected file is read and the waveform data that it contains is displayed in the Viewer window.
Display required file (waveform data) in the Viewer window



Creating a Folder

Select **Tools > New Folder** on the file list menu bar to display the folder creation dialog box. Input a name for the new folder, and then click the **OK**.

Note

- The new folder will be created under the current directory of the file list.
- For the folder name and upload file name, you can specify ASCII characters (alphanumerics, etc.) only.

Explanation

Cautions to Observe When Transferring a Waveform Data File

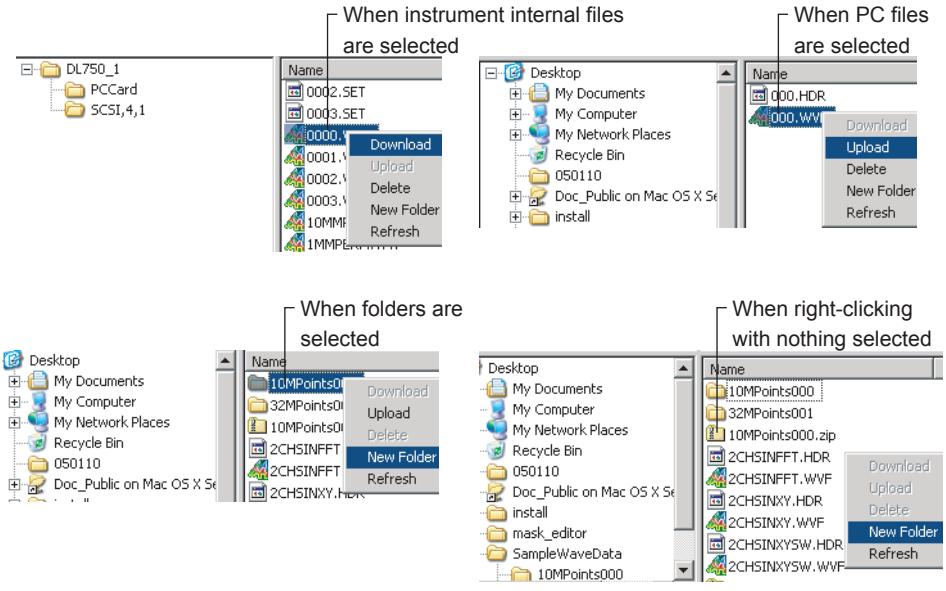
A WVF-format waveform data file (*.wvf) cannot be opened unless there is an .hdr file with the same name in the same folder. Therefore, when transferring a WVF-format file, be careful to also transfer the corresponding .hdr file.

Note

Right click the files selected to be manipulated, and select one of the following from the shortcut menu.

Download:	Available when the instrument internal files or folders are selected
Upload:	Available when PC files or folders are selected
Delete:	Available when a file is selected (With the SL1000, you can also select and delete a folder.)
Create folder:	Available whether a file, folder, or nothing is selected The following folder names cannot be used. AUX, CON, PRN, NUL, CLOCK, COM0 to COM9, and LPT0 to LPT9

Update to Latest Information: Available whether a file, folder, or nothing is selected



8.4 Operating the Instruments from a PC(Other than the DL9000/SB5000/DLM2000/DL6000/ DLM6000/DL850/DL850V)

Procedure

Displaying the Control Screen

Click the **Control Inst** on the **Xviewer tool bar** to display the Communication Setting dialog box. If you then select the required the instrument and then click the **Connect**, a connection with the instrument is established and the control screen (an image of the front panel) appears.

Note

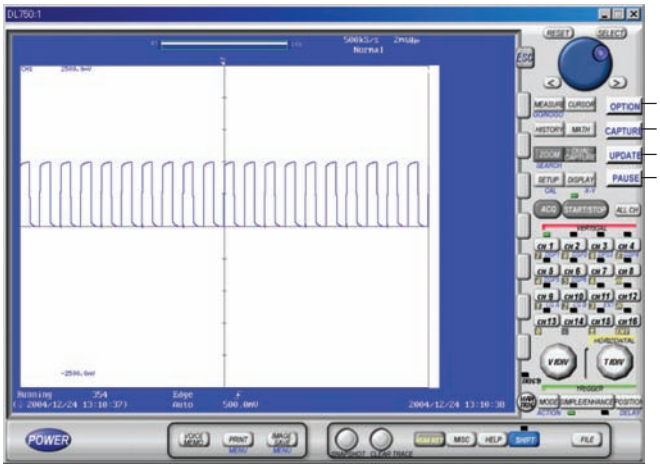
- If a connection has already been established with the required the instrument, the Communication Setting dialog box does not appear and the control screen appears immediately.
- When you click the “Open Inst” to display a list of files on the instrument, the “Control Inst” is grayed out.

Controlling the Update of the Display

Click the **UPDATE** on the control screen to forcibly update the control screen display. If you click the **PAUSE**, the update of the control screen is stopped temporarily. Clicking the **PAUSE** again restarts the update of the screen display.

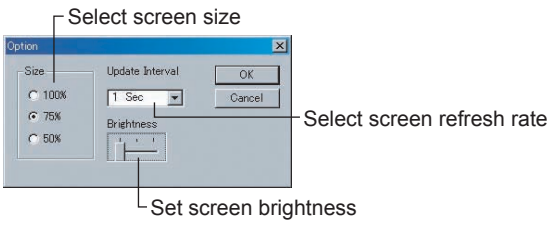
Operation of the Control Screen

The control screen allows you to operate or control a DL unit using the PC's mouse or keyboard.



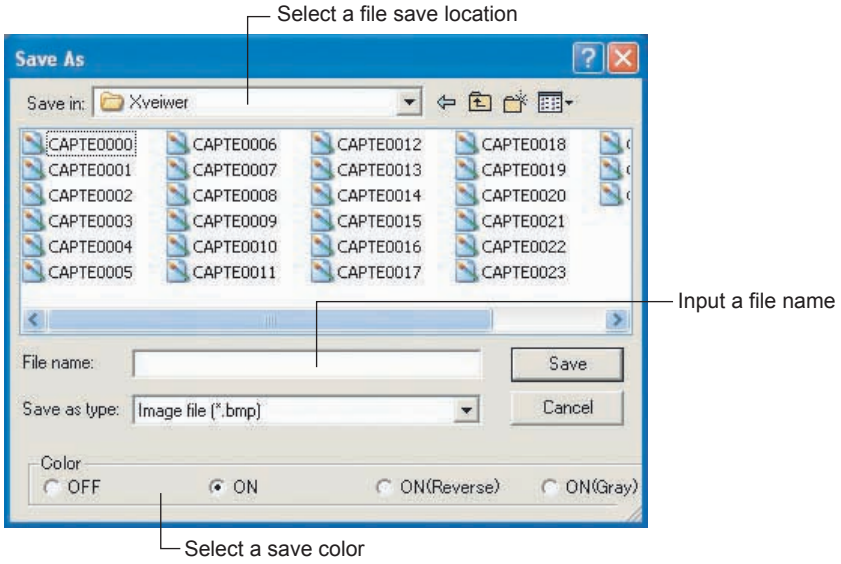
Setting Screen Display Options

Click the **OPTION** on the control screen to display the Option dialog box. Set the control screen display size, the refresh rate, and display brightness, and then click the **OK**.



Saving an Image of the Screen

Click the **CAPTURE** on the control screen to display the file save dialog box. Select the folder into which you want to save the file, specify the file name, select a save color and then click the **OK**.



Note

Press the SHIFT key (keyboard) and click the CAPTURE button (control screen) to copy the screen to the clipboard.

Explanation

Option Settings

The following settings can be made for the screen display options.

- Display size (**Size**) : Select 100%, 75%, or 50%
- Display refresh rate (**Update Interval**) : Select 1 sec, 2 sec, 5 sec, 10 sec, 30 sec, 1 Min, 5 Min, 10 Min, 20 Min, 30 Min, 1 hr, or Minimum
- Brightness (**Brightness**) : Adjust using the slide bar

Note

- Depending on the network transmission method or the communications load, the actual display refresh rate may be slower that the set value.
- When you select **Minimum** for the screen refresh rate, the fastest possible refresh rate for your environment is set automatically. Note that if the connection to the instrument is made via a network, the network load may affect the refresh rate.

Using the Display Update Button

- The UPDATE button is used to forcibly refresh the display when, for example, a slow refresh rate has been set or refresh has been temporarily stopped (when the PAUSE button is available).
- The PAUSE button is used to temporarily stop refresh when the ON/OFF settings of many items must be changed, values must be entered using the keyboard, or when better system response is needed.

Screen Image Save Format

When you click the CAPTURE button to save a screen image, an image of the currently displayed screen is saved as a BMP-format file.

Screen Image Save Color

When you save a screen image, you can select and of the following colors.

- **OFF** :Screen image is saved in monochrome
- **ON** :Screen image colors are saved as is
- **ON (Reverse)** :Other than the channel colors are saved in monochrome
- **ON (Gray)** :Other than monochrome colors are saved as grays

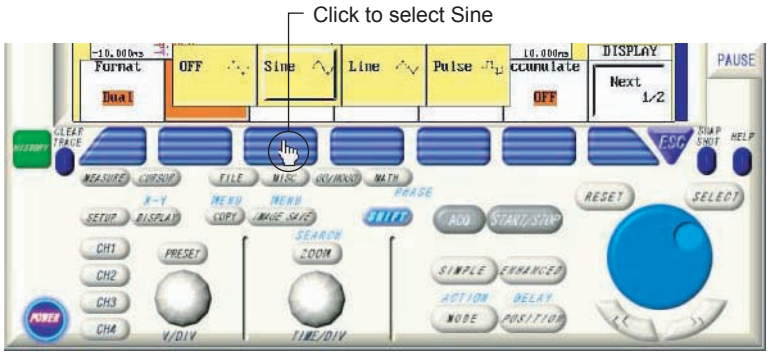
Using the Mouse

If you position the mouse cursor to a control key or knob on the control screen, the mouse pointer (icon) changes, indicating that key or knob on the screen can be operated. The displayed icon and the action of the mouse changes depending on where on the control screen it is positioned.

Mouse Pointer Position	Displayed Icon & Mouse Action	Setting Operation
Operation key		
	Click	Same as pressing an operation key
Soft key menu or dialog box		
	Click	Same as pressing a soft key or a button
	Wheel	Same as turning the jog shuttle
Voltage axis information display area		
	Click	Same as pressing a channel key
	Wheel	Same as turning the V/DIV knob
Time axis information display area		
	Wheel	Same as turning the T/DIV knob
Jog shuttle left- and right-hand areas		
	Click	Same as turning the jog shuttle to the left of the right
	Wheel	Same as turning the jog shuttle
V/DIV knob left- and right-hand areas		
	Click	Same as turning the V/DIV knob to the left or the right
	Wheel	Same as turning the V/DIV knob
T/DIV knob left- and right-hand areas		
	Click	Same as turning the T/DIV knob to the left or the right
	Wheel	Same as turning the T/DIV knob

Example of Using the Control Screen

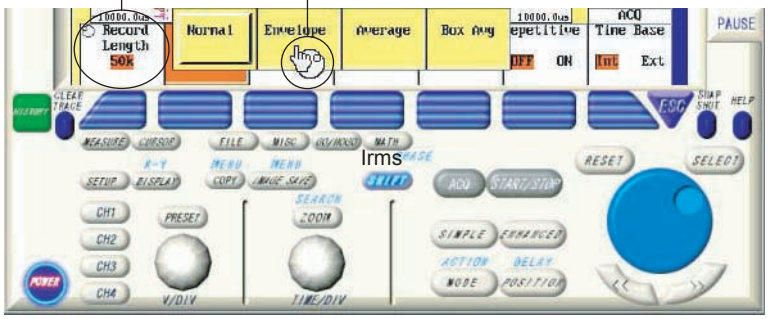
Using the Operation Keys



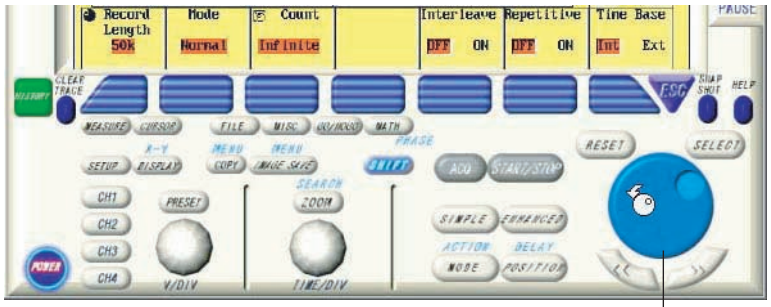
Soft Key Menu Operation

Turning the wheel here allows you to set a record length

Clicking here selects Envelope



Jog Shuttle Operation

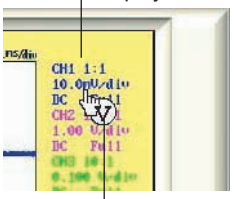


Clicking or turning the wheel here lets you set a record length

V/DIV Knob Operation

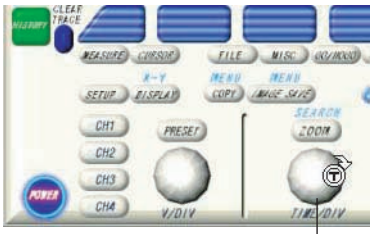
Click or turn the wheel

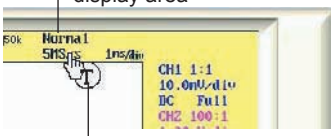
Voltage axis information display area



Turning the wheel changes the V/div setting

T/DIV Knob Operation





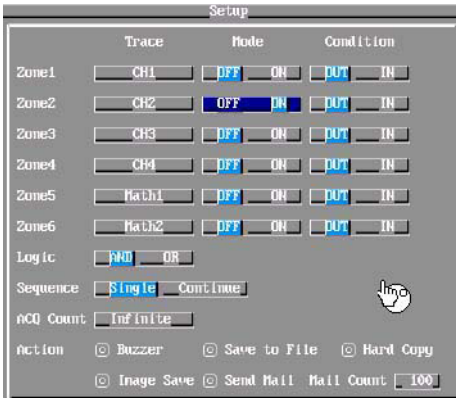
Voltage axis information display area

Turning the wheel changes the V/div setting

Click or turn the wheel

Dialog Box Operation

- Position the mouse cursor to the item you want to turn ON:
  Click the **jog shuttle** or turn the wheel
- ON/OFF setting:
  Click **SELECT** or click the item directly, as shown below


Setup
Trace
Mode
Condition
Zone1 CH1 OFF ON OUT IN
Zone2 CH2 OFF ON OUT IN
Zone3 CH3 OFF ON OUT IN
Zone4 CH4 OFF ON OUT IN
Zone5 Math1 OFF ON OUT IN
Zone6 Math2 OFF ON OUT IN
Logic AND OR
Sequence Single Continue
ACQ Count Infinite
Action Buzzer Save to File Hard Copy
Image Save Send Mail Mail Count 100

8.5 Operating DL9000/SB5000/DLM2000/DL6000/ DLM6000/DL850/DL850V from a PC

Displaying the Control Screen

Click the **Control Inst** on the **Xviewer tool bar** to display the Communication Setting dialog box. If you then select the required the instrument and then click the **Connect**, a connection with the instrument is established and the control screen (an image of the front panel) appears.

Note

- If a connection has already been established with the required the instrument, the Communication Setting dialog box does not appear and the control screen appears immediately.
- When you click the “Open Inst” to display a list of files on the instrument, the “Control Inst” is grayed out.
- In the following cases, the control screen display cannot be updated:
- While editing waveform, square, or polygon zones
- During processing of cycle statistics
- During statistical processing of history data
- In the following cases, the control screen display cannot be updated:
  - While editing waveform, square, or polygon zones
  - During processing of cycle statistics
  - During statistical processing of history data

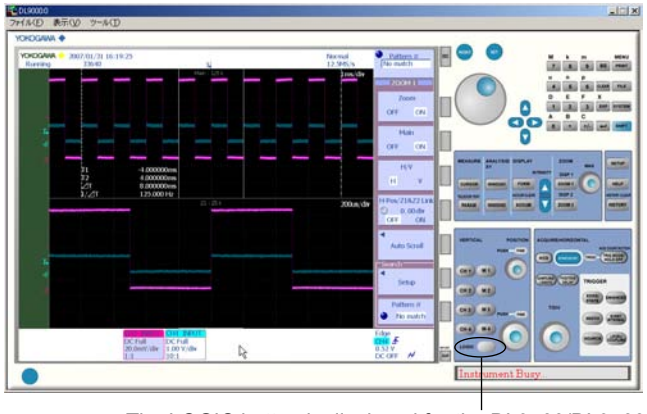
Controlling the Update of the Display

Choose **Menu > View > Update** in the control screen to force an update of the control screen. Choose **Menu > View > Pause** to pause updating of the control screen. To restart display updating, choose **View > Pause** again.

Operation of the Control Screen

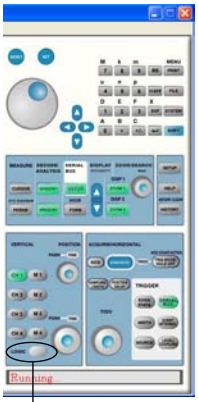
The control screen allows you to operate or control the instrument using the PC’s mouse or keyboard.

DL9000 Series



The LOGIC button is displayed for the DL9500/DL9700

SB5000 series



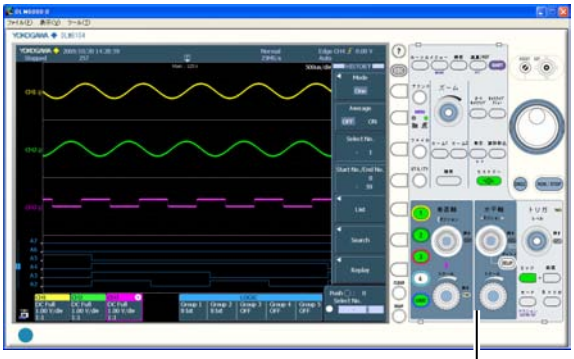
Series or SB5000 series.

DLM2000 series

English panel sheet

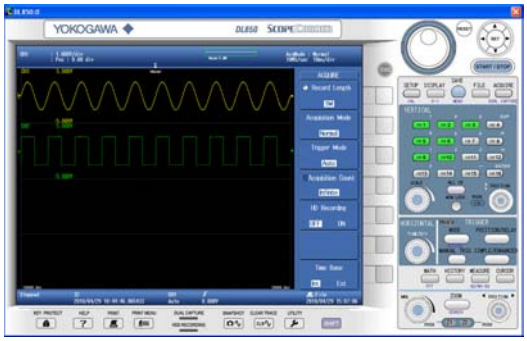
Displayed on 4-channel models and models with a logic input terminal.

DL6000/DLM6000 series



English panel sheet

DL850



Screen Display Size

Choose **Menu > View > Zoom > Smaller, Standard**, or **Larger**. The control screen changes to the selected size.

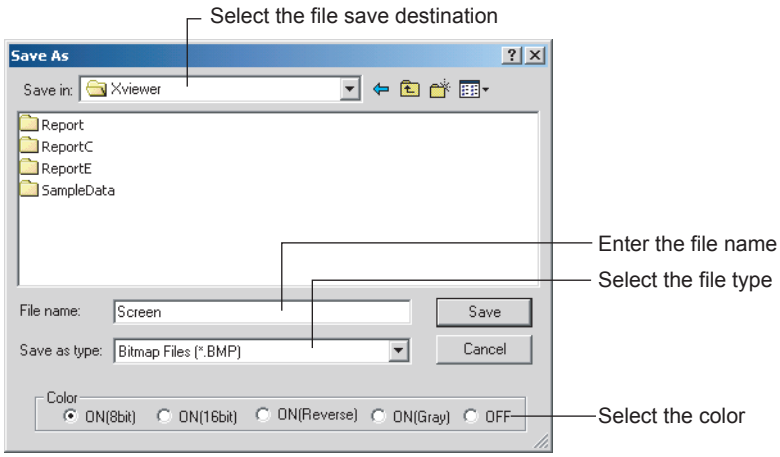
Copying the Image to the Clipboard

Select **Tools > Copy Image to Clipboard** or **Copy Image to Clipboard (Reverse)**.

- Copy Image to Clipboard
  The image of the display section of the control window is copied to the clipboard.
- Copy Image to Clipboard (Reverse)
  The image of the display section of the control window is copied to the clipboard without the background color.

Saving an Image of the Screen

Choose **Menu > File > Save > Image** in the control screen to display the file save dialog box. Select the folder into which you want to save the file; specify the file name, save as type, and color; and then click the **Save**.



Note

- If you hold down the ctrl key and right click in the control screen, you can select from the following settings menu.
  - Save > Image
  - Zoom > Smaller, Standard, Larger
  - Pause
  - Update
  - Options
- Do not connect from the PC while hard disk recording is occurring on the DL850.
- When controlling the DL850 from the PC, do not start hard disk recording on the DL850. Doing so can overload the DL850's internal processing, resulting in malfunction.

Explanation

Screen Display Size

You can select the zone from below.

Smaller, standard, larger

Display Update Interval

You can select the zone from below.

300 ms, 500 ms, 1 s, 2 s, 5 s, 10 s

Note

- Depending on the network transmission method or the communications load, the actual display update interval may be slower that the set value.
- With the DLM2000 series, the image on the PC may be disrupted immediately after transferring waveform screens or saving screen images. This does not affect the data. The image will recover automatically after the next screen update.

Display Update Operation Control

- Forced updating is used when setting a slow display update rate or when pausing display updating (by choosing Menu > View and selecting Pause).
- Pause is used to improve the response when turning many items ON/OFF at once, or when entering numerical and other values with the keyboard.

Screen Image Save Format

An image of the currently displayed screen is saved as a BMP-format file.

Selecting the Color Mode

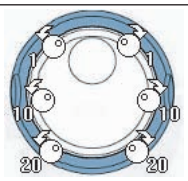
You can select the color mode. The selectable color modes vary between BMP and PNG formats.

- BMP : 8 bit, 16 bit, reverse, grayscale, and color OFF (black and white)
- PNG : 16 bit, reverse, grayscale, and color OFF (black and white)

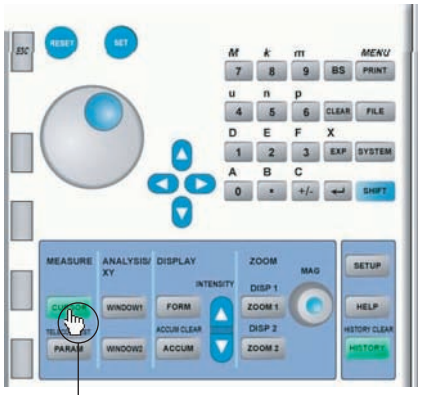
Using the Mouse

If you position the mouse cursor to a control key or knob on the control screen, the mouse pointer (icon) changes, indicating that key or knob on the screen can be operated. The displayed icon and the action of the mouse changes depending on where on the control screen it is positioned.

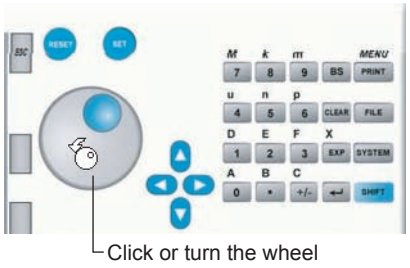
Mouse Pointer Position	Displayed Icon & Mouse Action	Setting Operation
Operation key		
	Click	Same as pressing an operation key
Roraty-knob left- and right-hand areas		
	Click	Same as turning the rotary knob to the left of the right
	Wheel	Same as turning the rotary knob
Center of POSITION, SCALE knob		
	Click	Same as pushing the POSITION knob or SCALE knob
	Wheel	
POSITION, SCALE, T/DIV, and MAG knob left- and right-hand areas		
	Click	Same as turning the POSITION, SCALE, T/DIV, and MAG knob to the left or the right
	Wheel	Same as turning the POSITION, SCALE, T/DIV, and MAG knob

Mouse Pointer Position	Displayed Icon & Mouse Action	Setting Operation
Operation Key		
	Click	Same as when pressing a key.
Around the left or right sideof the jog shuttle		
	Click	Same as turning the jog shuttle to the left or right. The setting can be changed at a setting resolution of 1, 10, or 20 times depending on the location of the mouse pointer. Hold down the mouse button to change the setting repeatedly.
	Wheel	Same as turning the jog shuttle.
Center of POSITION, SCALE, TRIGGER LEVEL, or ZOOM knob		
	Click	Same as pushing the corresponding knob.
Around the left, right, or bottom of POSITION or TRIGGER LEVEL knob		
	Click	Same as turning the corresponding knob to the left or right. The setting can be changed at a setting resolution of 1 or 10 times depending on the location of the mouse pointer. If you click in the bottom area where the number 123 appears, an input box is displayed for direct input of a setting value. Hold down the mouse button to change the setting repeatedly.
	Wheel	Same as turning the corresponding knob.
Around the left or right of SCALE, TIME/DIV, or ZOOM knob		
	Click	Same as turning the corresponding knob to the left or right. The setting can be changed at a setting resolution of 1 time.
	Wheel	Same as turning the corresponding knob.
Center of the SET key		
	Click	Same as pressing the SET key.
Around the left, right, top, or bottom of the SET key		
	Click	Same as pushing the SET key in the direction of the arrow.

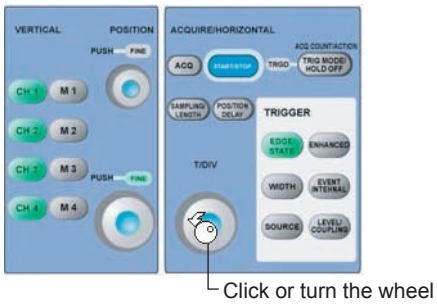
Example of Using the Control Screen Using the Operation Keys



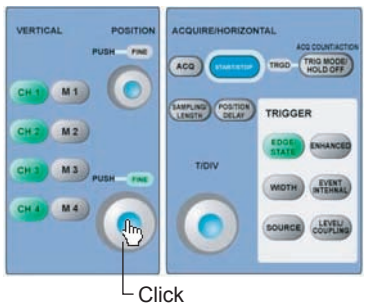
Rotary Knob Operation



T/DIV Knob Operation



SCALE Knob Pushing Operation



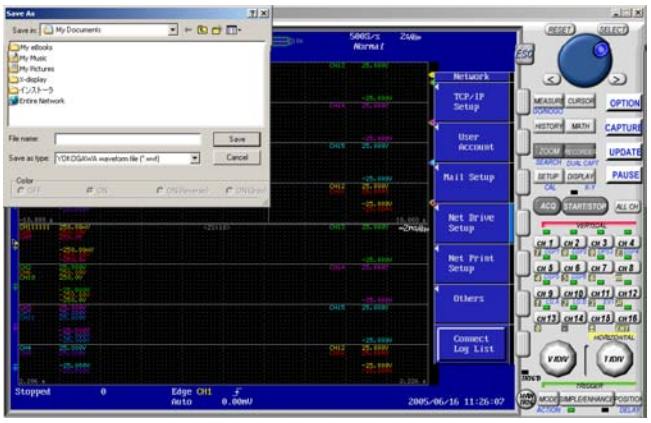
8.6 Downloading the Instruments Waveform Data (Other than the DL9000/SB5000/DLM2000/ DL6000/DLM6000/DL850/DL850V)

Procedure

Click the **ACQ save** on the Xviewer toolbar. A control screen and file save dialog box open. If the connection with the instrument is not established, the Communication Setting dialog box opens. Establish a connection with the instrument according to the operations given in section 8.1.

Saving the Waveform Data

Set the destination and file name and click the **OK**. The extension is .wvf.



Explanation

Waveform data can be downloaded (saved) to the PC.

Click the **CAPTURE** on the control screen to display the file save dialog box. Set Save as type to *.wvf, specify the file name, and select Save to download (save) the waveform data.

Waveforms That Are Saved

All waveforms including computed waveforms displayed on the control screen are saved. However, if multiple history waveforms are displayed with the history memory function, only the waveform selected with Select Record is saved.

Applicable Models

- DL750 series (firmware version 6.01 or later)
- DL1600 series (firmware version 1.30 or later)
- DL1700E series (software version 2.11 or later)
- DL7400 series (software version 2.11 or later)
- SL1400

Note

- If the data compression setting of the instrument (P-P Comp, Decim, etc.) is ON, turn data compression OFF before saving the waveform data.
- On the DL1600 series, waveform data cannot be downloaded if the record length is greater than or equal to 8 MW.
- When multiple history waveforms are displayed, the instrument settings are changed when downloading is executed as follows:
  DL750 series, DL7400 series, and SL1400: HISTORY > DisplayMode > One
  DL1600 series and DL1700E series: HISTORY > Display > One
- Sub waveforms acquired using the dual capture function on the DL750 are not saved.

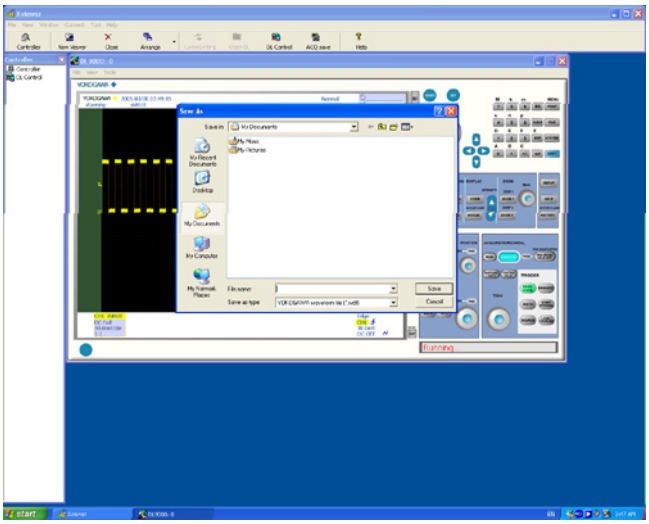
8.7 Downloading DL9000/SB5000/DLM2000/ DL6000/DLM6000/DL850/DL850V Waveform Data

Procedure

Click the **ACQ save** on the Xviewer toolbar. A control screen and file save dialog box open. If the connection with the instrument is not established, the Communication Setting dialog box opens. Establish a connection with the instrument according to the operations given in section 8.1.

Saving the Waveform Data

Set the destination and file name and click the **OK**. The extension is .wdf.



Explanation

Waveform data can be downloaded (saved) to the PC.
From the **File** menu on the control screen, point to **Save** and choose **Waveform** to display the file save dialog box. Set Save as type to *.wdf, specify the file name, and select Save to download (save) the waveform data.

Waveforms That Are Saved

All waveforms including computed waveforms displayed on the control screen are saved.

Applicable Models

- DL9000 series (firmware version 1.80 or later)
- SB5000 series
- DLM2000 series (firmware version 1.06 or later)
- DL6000/DLM6000 series
- DL850/DL850V

Note

The image on the PC may be disrupted immediately after downloading waveform data. This does not affect the data. The image will recover automatically after the next screen update.

9.1 Troubleshooting

Problem	Probable Cause/Corrective Action
An error occurs when installing	Another version of Xviewer is already installed. Uninstall the other version of Xviewer, then reinstall.
Xviewer cannot communicate with the instruments (DL series, SL1400, SL1000, or DLM2000, or DL6000/DLM6000)	The GP-IB, USB or Ethernet interface cable is incorrectly connected Connect the cable correctly. The address specified for the GP-IB interface is incorrect. For instruments other than the DL9000, SB5000 SL1000 DLM2000/DL6000/DLM6000/ DL850/ DL850V, the ID of the USB interface might be set incorrectly. For instruments other than the DL9000, SB5000 SL1000 DLM2000/DL6000/DLM6000/ DL850/ DL850V, the serial number of the USB interface might be set incorrectly. A USB driver might not be installed. The IP address, subnet mask, and default gateway of the Ethernet interface might not be set correctly. With the SL1000 DLM2000/DL6000/DLM6000/ DL850/DL850V, the VXI11 check box might not be selected.
A file cannot be opened	A .hdr file having the same name as the file you are trying to open is not present in the same folder. Place the header file in the folder. The file is not of a type that the instrument Xviewer can handle.
A trace name is incorrectly displayed	If a trace name includes a space, it may not appear correctly.
A voice memo cannot be played back	Your PC does not support audio playback Use Xviewer on a PC with sound capabilities.
Comments in files saved on the DL750 series are not displayed	DL750.dll does not exist in the folder in which Xviewer is installed, or an old version of DL750. dll exists Install the latest version of DL750.dll(see page 2-3).
The Yokogawa web site is inaccessible	Your PC is connected with the Internet.
A message stating “Insufficient memory. Terminate any unnecessary applications.” appears.	There is insufficient memory Reduce the number of waveforms to be loaded, or terminate another application.
I cannot load files that were recorded in real time on the SL1000/DL850/DL850V series.	You may be specifying a divided file from real-time recording other than the first file. Try loading the first file (****_0000.WDF).

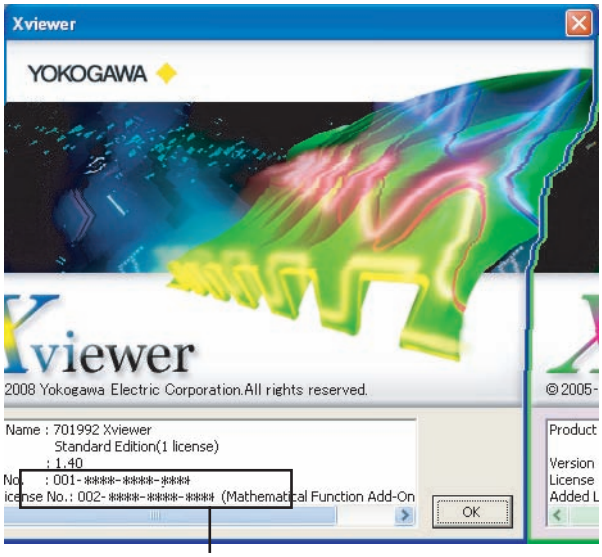
Note

For up-to-date information on the Xviewer, check the YOKOGAWA Website (see section 9.4).

9.2 Viewing Version Information

Procedure

Select **Help > About Xviewer** The version of Xviewer you are currently using is displayed.

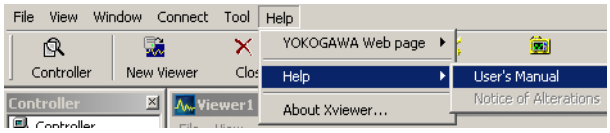


Displays the version information including the added license number

9.3 Starting Online Help

Procedure

Click Help or choose **Help > Help > User's manual** on the tool bar If Acrobat Reader is installed in the PC, it launches, and a pdf file of this instrument's user's manual is displayed.



Explanation

Online Help

You can display a pdf file of this instrument's user's manual If a notice of alteration has been made, you can display a pdf of the notice by choosing **Help > Help > Notice of Alteration** from the tool bar.

Note

Adobe Reader by Adobe Systems is required to open PDF files You can download Adobe Reader from the following Web page.
http://www.adobe.com/products/acrobat/readstep2.html

9.4 Visiting the Yokogawa Electric Web Page

Procedure

Select Help > **YOKOGAWA Web Page > Test & Measurement**, or **Help > YOKOGAWA Web Page > Xviewer** to access our web page.

Explanation

When your PC is connected to the Internet, you can visit our web page.

Test & Measurement: Displays our Test & Measurement top page.

Xviewer: Displays the Xviewer page. Up-to-date information such as updates on the Xviewer is provided.

9.5 Adding a License Number

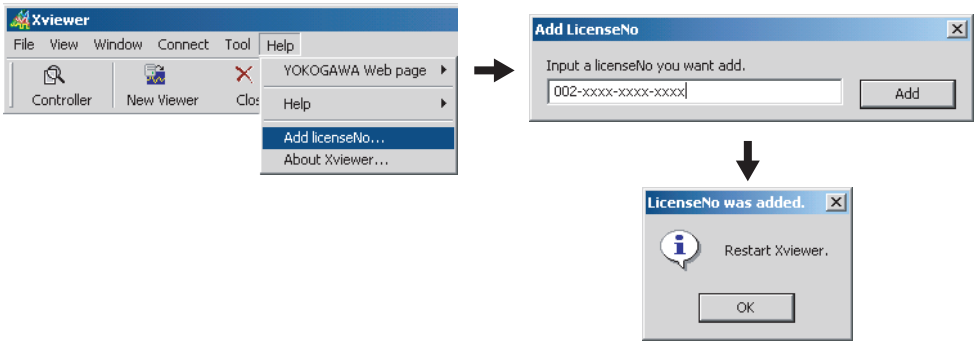
Procedure

You can update the standard version of Xviewer by adding the license for the XViewer Math Edition.
701992 Xviewer (latest standard version after version 1.31) must be installed before installing the Computation Function Setup Upgrade Version
If the version of Xviewer that you are using is old, uninstall it and then install the latest Xviewer.

Note

- For the installation and uninstallation Procedures, see page xi.
- To check the version, see section 9.2, “Viewing Version Information.”

1. Start Xviewer (standard version) that is already installed.
2. Select **Help > Add licenseNo**. The dialog box for registering the license number opens.
3. Enter the number indicated on the license label, and click **Add** If the upgrade completes successfully, a message appears prompting you to restart Xviewer
4. Click **OK**.
5. Restart Xviewer.



6. Select **Help** > **About** Check the version information For details, see section

10.1 Applicable Models and Features

Models from which Xviewer can load waveform data:

DL750 series, DL9000 series, SB5000 series, DL7400 series, DL1700 series, DL1700E series, DL1600 series, WE7000, SL1400, SL1000, DLM2000 series, DL6000/DLM6000 series, and DL850/DL850V

File Types Supported by Xviewer

- Files created and saved in binary format (.wvf files)
  DL750/DL7400/DL1700/DL1700E/DL1600 series, SL1400, and WE7000
- Files created and saved in ASCII format (.csv files)
  DL750/DL9000/SB5000/DL7400/DL1700/DL1700E/DL1600 series, SL1400, WE7000, DLM2000 series DL6000/DLM6000, and DL850/DL850V
- Files created and saved in binary format (.wdf files) DL9000 series, SB5000 series, SL1000, DLM2000 series DL6000/DLM6000, and DL850/DL850V
- Files of data created with real-time recording (.wdf files)

Models for which Xviewer can view and transfer files:

DL750 series, DL7400 series, DL1700E series, DL1600 series, DL9000 series, SB5000 series, SL1400, SL1000, DLM2000 series DL6000/DLM6000, and DL850/DL850V

Models for which Xviewer can be remotely controlled:

DL750 series, DL7400 series, DL1700E series, DL1600 series, DL9000 series, SB5000 series, SL1400, DLM2000 series DL6000/DLM6000, and DL850/DL850V

Models on which acquisition data can be downloaded

DL750 series (firmware version 6.01 or later),
DL1600 series (firmware version 1.30 or later),
DL1700E series (firmware version 2.11 or later),
DL7400 series (firmware version 2.11 or later),
DL9000 series (firmware version 1.80 or later),
SB5000 series, SL1400, and DLM2000 series
SL1400
DLM2000 series
DL6000/DLM6000 series
DL 850/DL850V

Available Functions

- Main waveform view, zoom waveform view, history waveform view, X-Y waveform view, and measurement result view
- Measurements with vertical/horizontal/X-Y cursors
- Waveform parameter automatic measurement/computational measurement (optional)/ Insertion of annotations
- Multiple files conversion (wdf to wvf, wvf/wdf to csv)
- Saving and printing of the data
- Play back of voice memos saved with the DL750 series

10.2 System Environment Requirements

Operating System		
	Microsoft Windows XP (SP 2 or later)	Microsoft Windows Vista or Windows 7
PC Hardware		
CPU	Pentium 4, 2 GHz or better	Core 2 Duo, 2 GHz or bette
Memory	512 MB or more (1GB recommended)	1 GB or more (2GB recommended)
Space available on HDD	Free space equaling 2 GB + the size of files to be loaded	
Peripherals		
Display	XGA or higher (Colors: 65536 or more)	
Drive	CD-ROM drive, mouse, and printer	
Communication interface	GP-IB*1/USB*2/Ethernet	
GP-IB Board or PCMCIA Card	GP-IB board made by National Instruments Corporation or PCMCIA card*3	
Sound capabilities	Required to play back voice memos.	

*1 Not supported by the SL1000.

*2 • To use the USB interface, Xviewer requires that the USB driver for the DL series be installed.
• If the PC's OS is Windows Vista or Windows 7, communications via the USB interface are not supported with the DL9000/SB5000 series, DL6000/DLM6000 series.

*3 The operation of the PCMCIA-GPIB card is not guaranteed on Windows Vista or Windows 7.

DPI setting

To display the characters correctly on Xviewer, you must set the "Display Properties" of Windows. In the Display Properties dialog box, click the Settings tab and click Advanced. Under the General tab, set the "DPI setting" to Normal size (96 DPI). The Font size setting under the Appearance tab in the Display Properties dialog box is irrelevant.

10.3 Software Versions and the Added Functions

The table below shows the software versions and the corresponding added functions. If the software is not of the newest version, you will not be able to use all the functions covered in this manual. Check the software version on the version information screen that appears by selecting **Help > Version**. For details on the procedure, see section 9.2.

Software Versions and the Main Functions That Have Been Added

Version	Added Function	Applicable Models	Reference Page/ Section/Chapter
1.10 or later	Support for DL9000[*1]	DL9000 Series	Section 10.1
	ACQ save function (Downloads the DL acquisition data to the PC)	DL750 Series/ DL1600 Series[*2]	Section 8.4
	Log scale (Set vertical and horizontal axes when displaying the FFT waveform)	–	Page 3-5 and section 3.4
	Display the range over which FFT is performed and set the start point	All models[*3]	Section 4.4
	Display the computation start position marker and set the start point	All models[*3]	Page 4-11
	Analyze waveform data using H&V cursors	All models[*3]	Section 4.2
	File associations (wvf and wdf) (Double-click the file to start Xviewer)	–	Page 1-1
	Drag and drop CSV files on the viewer window	–	Page 2-4
	Restore the waveform color and the number of divided displays when the file is loaded[*4]	DL750 Series/ DL9000 Series	–
1.20 or later	Supports the DL9000[*5]	DL9000	Section 8.5 and 10.1
	ACQ save function (Downloads the DL acquisition data to the PC)	DL1700E/DL7400 series[*6]	Section 8.4
	Copying of cursor/waveform parameter measurement results to the clipboard	–	Sections 4.2 and 4.3
	Automatic display of the measurement results window	–	Section 4.1
	Restored when loading waveform color, number of display divisions, and vertical axis upper and lower limit values[*7]	DL1600/DL1700E/ DL7400 series	–
	Arrange Controller window/Xviewer tool bar/Viewer window	–	Section 1.2
	Displays T/Div and V/Div on the waveform display window	–	Section 3.4
1.21 or later	Open DL, and ACQ save function (Displays and transfers DL files and downloads the acquisition data to the PC)	DL9000 series[*8]	Section 8.1, 8.2, 8.3, 8.7 and 10.1
1.30 or later	Supports the SL1400	SL1400	Section 10.1
	Report function	–	Chapter 7
	Displays 0 level on the waveform display window	–	Page 3-10
1.31 or later	Support for DL9710L.	DL9710L	Chapter 8
	Additional display format of the measured result (hexadecimal, Bundle display)	–	Page 3-5
	Additional Measure item (integration of the X-Y waveform)	–	Pages 4-7 and 4-8
(Continues to the next page)	Horizontal zoom operation (expand or reduce at the clicked position and drag the window)	–	Section 2.6

10.3 Software Versions and the Added Functions

Version	Added Function	Applicable Models	Reference Page/ Section/Chapter
1.31 or later	Bit Label display and multiple vertical axes display added to the waveform display window	–	Page 3-10
	Edit function added to the report function (undo, redo, and grid display)	–	Section 7.2
	Save format of the screen image added in the DL control	–	Section 8.5
	Overlaying of the X-Y waveforms	–	Section 2.5
1.32 or later	Support for the DL1735E, DL9505L, DL9510L, and DL9705L.	DL1735E, DL9505L, DL9510L, DL9705L	–
	Changed button names (Open DL -> Open Inst., and DL Control-> Control Inst.).	–	Sections 1.2 , 8.1,8.2, and 8.4
	Added function for selecting Absolute Time or Relative Time when saving ASCII files.	–	Sections 5.1 and 5.6
	Changed name of CSV conversion function menu (Convert to CSV -> CSV Multiple files conversion), and added function for selecting the save folder.	–	Section 5.6
	Added function for converting WDF files to multiple WVF files.	–	Section 5.7
	Added function for setting the background color to white for printing.	–	Section 6.2
	Added function to the report function for saving to rich text format (rtf).	–	Section 7.3
1.33 or later	Support for SL1000.	–	Section 10.1
1.34 or later	Support for SB5000 series.	SL1000 SB5310/SB5710	Section 10.1
1.40 or later	Support for Windows Vista	–	Section 10.2
	Added function for manual placement of waveforms on the split screen	–	Section 3.2
	Added character size changing function for T/div display	–	Section 3.4
	Added initialization function for screen display conditions	–	Section 3.5
	Added types of annotations, and improved annotation functions	–	Section 4.5
1.41 or later	Support for DLM2000 series (excluding GP-IB communications and the acquisition data download function.)	DLM2022/DLM2024/ DLM2032/ download DLM2034/DLM2052/ DLM2054	Section 10.1
1.43 or later	Full support for the DLM2000 series	DLM2022/DLM2024/ DLM2032/ DLM2034/ DLM2052/DLM2054	Section 10.1
1.44 or later	Support for the SL1000 mark function	SL1000	Section 10.1
1.51 or later	Support for DL6000/DLM6000 series	DL6000/DLM6000 series	Section 10.1
1.60 or later	Support for DL850	DL850	Section 10.1
1.6 1 or later	Support for DL850V DL850 Advanced Utirity	DL850	Section 10.1 or IM701992-62E

*1 Waveform data (wdf file) can be loaded.

*2 Supported on version 1.30 or later on the DL1600 Series and version 6.01 or later on the DL750 Series.

*3 DL750 Series, DL9000 Series, DL7400 Series, DL1700 Series, DL1700E Series, DL1600 Series, and WE7000 are added to the waveform display window

*4 With the DL750 series, even if you load files that were saved with P-P Com ON in the Save As dialog box, the Upper/Lower, colors, and number of screen divisions are not restored.

*5 Only remote control possible

*6 DL1700E series: Version 2.11 or later, DL7400 series: version 2.11 or later

*7 With the DL1600 series, even if you load files that were saved with Invert ON in the channel settings, the Invert information is not restored.

*8 DL9000 series: Version 1.80 or later

Index

A

About Xviewer 9-2
Adding an Element 7-6
Address 8-3
Aligning Element 7-6
ASCII Format 5-2

B

Basic Information 7-3
Binary Format 5-1

C

Changing the Element Property 7-6
Clipboard 4-32
Closing Xviewer 1-1
Color 3-10
comment 2-2
Common Property 7-3
CommSetting 8-1
Communication Setting 8-1
Computational Expression 4-10, 4-12
Connecting to the Instrument 8-1
Controller window 1-2
Control Screen 8-10, 8-15
conversion 5-11, 5-13
CSV 5-11
Cursor 4-2
Cursor Data Order 3-6

D

Deleting an Elemen 7-6
Deleting a Report File 7-9
Display Setting 3-9, 5-10
Download 8-7
Dual Capture 2-16

E

Editing Report 7-4
Element Property 7-3
Example of Using the Control Screen 8-12, 8-20

F

FFT 4-11
File List 8-5
Filter 4-11
FLD 5-15
Floating Point Decimal File 5-3

G

Graticule 3-9
Grouping Channels 2-17, 3-2

H

H&V Cursor 4-3
History View 2-9
History waveform display window 1-3
History Window 2-9
Horizontal Axis 3-9
Horizontal Cursor 4-2

I

Image Element 7-2
Image file 5-8
Initialize Viewer 3-13
Installing xi
Int1TY: 4-7
Int1XY 4-7
Int2TY 4-7
Int2XY 4-7

L

Layout View 7-2
License Number 9-5
Loading a Report File 7-9
Loading Display Settings 3-1
Loading Waveform Data 2-1

M

Main waveform display window 1-3
Main Window 2-6
Mark List 2-18
Math Setting 4-10
Measurement result display window 1-3
Measurement Result Element: 7-2
Measure Result 3-6, 4-1
Measure Waveform Parameter 4-5

N

Notational Format 3-3, 3-5

O

Operation of the Control Screen 8-10, 8-15
Operator 4-14

P

Precautions x
Printer Setup 6-1
Print Format 6-2
Printing Background 6-4
Printing Report 7-10
Print Mode
  DISPLAY 6-3
  LONG 6-3
Printout Sample 6-3
Print Preview 6-3
Property by Type 7-3

R

Report Function 7-1
Report List 7-2, 7-6

S

Saving a Report File 7-9
Saving the Display Setting 5-10
Saving Waveform Data 5-1
Scale 3-2
Setting info 5-10
Setting Up a Printer 6-1
Setting Up the Print Format 6-2

Show or Hide 3-2
Software Versions and the Added Functions 10-3
Split 2-15
Split Setting 3-8
Starting Xviewer 1-1
Switching between Groups 2-17
System Environment 10-2

T

Text Element 7-2
Thumbnails 8-6
toolbar 1-2
Tooltip 2-6
Transferring Waveform 5-6
Transfer to Excel 5-6

U

Uninstalling xiv
Upload 8-7
User Name 8-3
Using the Mouse 8-12

V

Version 9-2
Viewer window 1-2
voice memo 2-2

W

Waveform Color 3-2
Waveform in the Computation View 4-10
waveform parameter 4-6
Waveform Vertical Zoom&Move 2-13
WDF 5-15
Web Page 9-4
Window Image 7-3
Window Image Element 7-2
WVF 5-15

X

X-Axis 2-11
X-Y Cursor 4-3
X-Y waveform display window 1-3
X-Y Window 2-11
XLS Format 5-3
Xreport Window 7-2

Z

Zoom 2-7
Zoom Factor 2-7
Zoom Rate 2-8
Zoom waveform display window 1-3